ANNUAL RATES OF SUBSCRIPTION.

Farmers, Graziers, Horticulturists, and Schools of Arts, **One Shilling.** Members of Agricultural Societies, **Five Shillings,** including postage. General Public, **Ten Shillings,** including postage.

VOL. XXXVII. 1 MARCH, 1932. PART 3.

Event and Comment.

Unemployed Youth—A Practical Scheme.

LECTURES and practical demonstrations arranged for the benefit of boys who, on account of the economic depression, have found the doors of industry closed against them and who are attending the Salvation Army Training Farm for Boys at Riverview, near Brisbane, are already producing good results. From a preliminary examination after a two-month term, it is evident that useful work is being done in giving these lads a more practical insight into the business of pig-raising and other branches of rural enterprise. Incidentally, it is worthy of note that when these lads finish their course at Riverview, they are available for farm work, and those of them who have already obtained jobs in the country are proving their worth and the value of their training. This worthy scheme is worked in co-operation with the Department of Labour and Industry and Repatriation Department; while officers of the Department of Agriculture and Stock assist in a practical way.

Pig Clubs.

QUEENSLAND pig club members will this year have a much more difficult task ahead of them than that which characterised their work last year. Seasonal conditions at the opening of the term being less favourable and pig prices ruling lower than normal, club work in 1932 will have to be organised on the most efficient lines, and every possible care and attention will have to be given to the subject-matter and to the stock in order to secure best results. With a view to assisting club members in their work the Departmental booklet "Lessons on Pig Raising," has been revised and added to and copies are now available, free of cost, on application to the Department of Agriculture and Stock, or through the teacher of the school. Lessons one to nine are packed full of practical information of real interest to the young farmers who aim to market their stock to the best advantage possible. The lessons are illustrated by drawings, all of which are described clearly and will be found to be of value also to pig-raisers of maturer years.

Summer Sickness in Pigs.

SEVERE heat of the present summer, combined with the results of dry weather in shortage of green food and water, makes pig-raising a somewhat hazardous business on farms where conveniences are not available for the storage of those essentials; this is more particularly so during periods when stores are high in price and pigs ready for market are selling at unsatisfactory values.

The Senior Instructor in Pig Raising has recently issued a circular dealing with ailments in pigs in which sunburn and sunscald, sunstroke, heat stroke, and heat apoplexy are described in practical terms, and remedies suggested such as can be put into operation by the farmer unfortunate enough to have animals suffering with summer disorders. Consequent losses, plus ordinary transit risks, are serious enough to warrant careful study of the information available, and the application of measures of prevention. The notes are available in leaflet form, and copies may be had gratis on application to the Under Secretary, Department of Agriculture and Stock, Brisbane.

Faulty Castration of Pigs.

RECENT reports from several slaughtering inspectors call attention to serious losses resulting from improper castration of pigs in preparation for marketing as porkers and baconers. There is no more important job associated with the raising and marketing of pork and bacon pigs than that of having animals of the right type in the primest condition at the time they go forward to the factory. With the knowledge that this simple surgical practice is essential in preparing male pigs for the meat market, and with the further knowledge gained from experience and observation that many beginners as well as many older farmers do not know how to perform the operation correctly, detailed instructions written in everyday language has been prepared by officers of the Department of Agriculture and Stock for free issue. This useful pamphlet should be on hand on every farm, for even without any technical knowledge the busy farmer should be able, after a careful study of the text and its graphic illustrations, to carry out the job successfully. Some experience and practice is, however, certainly an advantage in such operations, but to all the information will be valuable, and even the experienced farmer may be able to pick up fresh points from this practical and informative treatise.

The Cow and the Scientist.

HOW is milk made? This is one of the unsolved mysteries of science, according to Sir William Dampier, F.R.S., who reviews, in the Empire Marketing Board's latest report, the extent and objects of dairy research. Scientists have still to discover how cows turn the raw material—grass—into the finished product of which we make such good use.

This report will be of special interest to Australia in view of the fact that the Council of Scientific and Industrial Research has recently been reviewing the dairying situation. The Council wishes to get a picture of how research can best be applied to help the Australian farmer to increase the efficiency of his industry. This report answers the question "What is dairy research?" and suggests the lines on which work should be concentrated in order to reduce costs of production and improve the quality of milk.

Although the process of milk manufacture remains the cow's trade secret, it does not possess that great virtue of mass production—the ability to turn out an exactly standardised article. Charts worked out at the National Institute for Research in Dairying at Reading show that the composition of the same cow's milk varies from day to day and even from morning to night. This alteration in quality in turn affects the butter or cheese. More research is needed on the factors such as

feed, breed, and climate, which may cause these variations. Further research is needed most urgently in the following fields:—Improvement of pastures by plant-breeding and by better management—e.g., frequent cutting and intensive grazing. The effect of differences in rationing on the composition of milk. The inheritance of high milk-yielding qualities in cattle. The physiology of milk secretion. The inoculation of cattle against tuberculosis. The survival of disease germs in dried and condensed milk. The ripening of cheeses and the effect of storage conditions on butter and cheese. Economics of the industry.

Science has already achieved results which are of direct interest to Australia. In the field of nutrition, for instance, the most recent advance is the discovery that young, fresh grass has a high protein content which makes it comparable with expensive concentrates such as linseed cake. "Young grass is specially efficacious in increasing the yield of milk," Sir William Dampier says. "It is now, or soon will be, available, in large quantities in the form of ensilage or dried cake, and more experiments on its influence on the quantity and quality of milk should be made as quickly as possible. It is of great importance to the overseas Dominions as well as to Great Britain."

The work on the mineral needs of cattle, which natural pastures often fail to supply, is already well known in Australia.

Water Blister or Soft Rot of Pineapples.

WATER BLISTER or soft rot is a serious disease of pineapple fruits which develops during transport and storage, and causes most damage during the warm wet season between January and April. It is estimated that it is responsible for a yearly loss of £10,000 to the industry. This disease is known to occur in other parts of the world under different names. Water blister is a term used by Australian market agents, and, besides describing inadequately the symptoms of the trouble, has led to some confusion as to its actual nature.

The organism which causes this disease (*Thielaviopsis paradoxa*) was isolated some years ago by the pathological staff of the Queensland Department of Agriculture and Stock, but it was not until a joint investigation was made by that Department and the Council for Scientific and Industrial Research, commencing in 1928, that it became apparent that "water blister" and the fruit rot of other countries were one and the same disease.

The organism responsible for soft rot of pineapple fruits also causes a base rot of pineapple plants. It also affects sugar-cane, cocoanut and betel palms.

After examining twelve hundred affected pineapples on the Sydney markets, a 75 per cent. infection through the cut end was found. In other cases, infection occurred through injuries or through minute growth cracks. Infected fruit break down ultimately to a watery rotten mass, although the skin remains intact and brittle.

From recent investigation it has been found that if benzoic acid as applied to the cut stem end of the fruit, infection at this point can be eliminated and losses can be reduced considerably. A mixture of one part of benzoic acid to four parts of kaolin was also found to be equally effective, and much cheaper to apply. This mixture is now available on application to the Committee of Direction of Fruit Marketing.

This disease may be avoided to a great extent by practising strict sanitation on the plantation and in the packing shed. All refuse should be collected carefully and destroyed. Should a shed become badly contaminated it should be cleaned thoroughly and sprayed with a 5 to 10 per cent. solution of formalin. Furthermore, great care should be taken in handling and packing fruit in order to avoid bruising or breaking the skin.

THE QUEENSLAND SUGAR INDUSTRY.

By H. T. EASTERBY, Director, Bureau of Sugar Experiment Stations.

PART XXIV.

(f) Sugar Prices, &c.—*continued.*

THE last article dealt in part with the recommendations of the Federal Committee of Inquiry which sat in 1930 and presented its reports early in 1931.

The conclusions on which the Committee agreed having been set out in my last article, the findings of the majority of the Committee will now be summarised. These were as follows:—

1. That the embargo upon the importation of sugar into Australia be renewed and continued for a period of five years.
2. That, subject to our third recommendation hereunder, the prices for sugar and the conditions of the sale thereof as set out in the present agreement be maintained for three years, and for the balance of the term—namely, two years—such prices and conditions be reviewed by the Commonwealth Government in the light of the circumstances then existing.
3. That the provision in the present agreement for the special price payable by manufacturers engaged in processing all fruit products for home consumption, and the provision for the rebate on sugar contents of fruit products exported, be eliminated, and in lieu thereof a clause be inserted providing that a sum of £315,000 per annum be made available by the sugar industry for the assistance of the fruit industry. . . . This provision to be subject to review as in the case of the rest of the sugar agreement at the end of the three years' period above mentioned.

The Minority report was signed by the remaining three members—namely, the Chairman and the representatives of the domestic consumers of sugar in Australia and the Australian manufacturers who use sugar as a raw material in their products. The summary of recommendations made by the Minority were—

1. That the industry take definite steps to reduce the unprofitable surplus production.
2. That the prohibition of the importation of sugar be continued for a period of five years commencing from the date of the termination of the existing agreement between the Commonwealth Government and the Government of Queensland (31st August, 1931).
3. That prices for sugar to Australian consumers be reduced by £2 6s. 8d. per ton for the two years ending 31st August, 1933, and that at that time a review of the conditions of the industry be made by the Commonwealth Government with a view to determining the practicability of a further reduction in price. . . . The responsibility of seeing that the proposed reductions are passed on to domestic consumers to be placed on the industry, and that the present rebate of £6 5s. 1d. per ton to manufacturers engaged in processing fruit products for home consumption be continued.

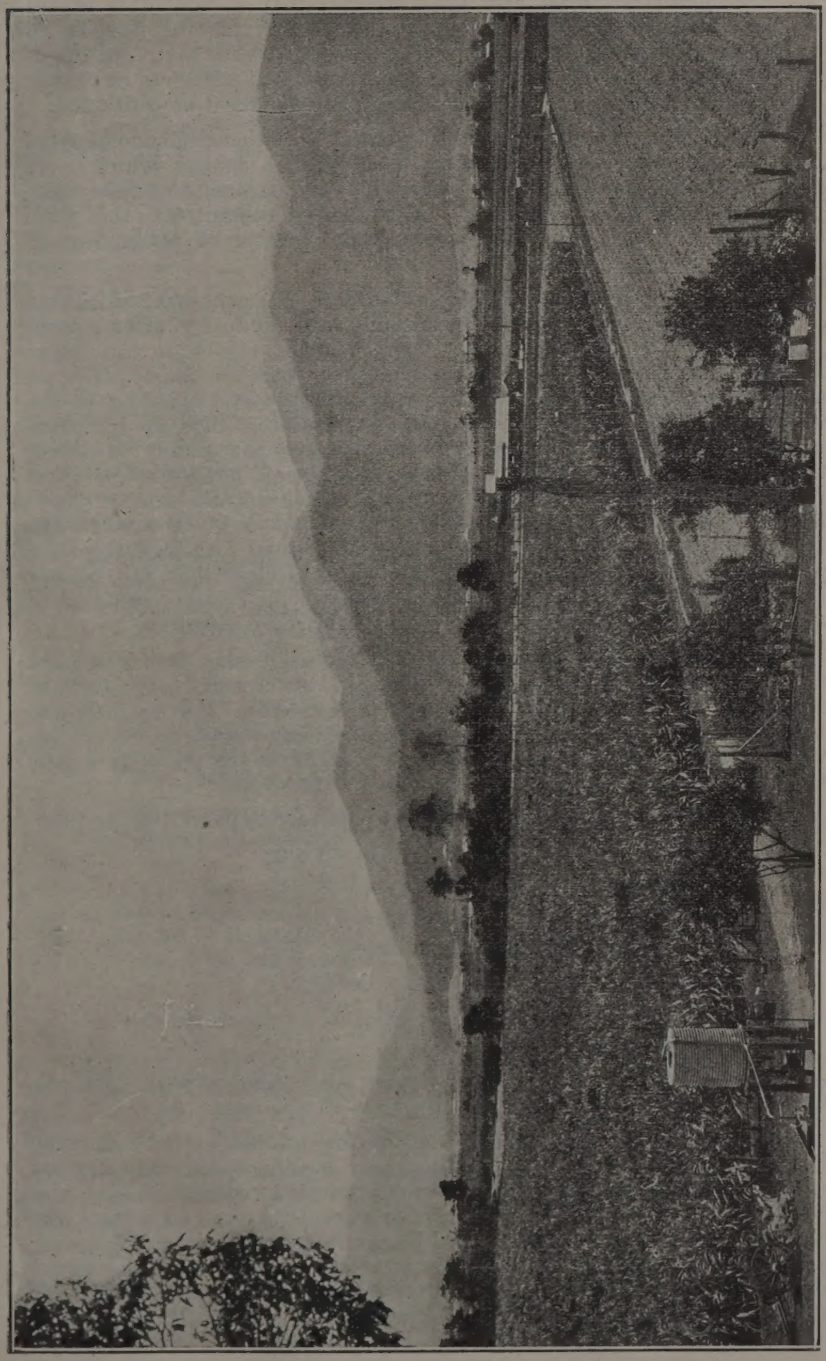


Plate 34.—Cane Fields at the foot of Mt. Bartle Frere, Babinda.

The Minority report also recommended that a committee of the various interests concerned should be established for the purpose of disbursing the rebate of £6 5s. 1d. per ton together with the reduction of £2 6s. 8d. recommended, and that the rebate paid to exporters in respect to cane sugar contents in manufactured goods exported be continued.

The Majority report was, in all essential conditions, the one adopted by the Commonwealth, with certain additional clauses which were included in the new agreement between the Commonwealth and the State providing for the establishment of necessary committees, the rigid enforcement of the peak year scheme, and system of assignment of sugar-cane lands, &c.

This was a matter for congratulation, and its acceptance constituted a complete vindication of the Queensland sugar industry after a most searching and exhaustive inquiry. Great credit is due to the Sugar Associations concerned which combined to form a Sugar Defence Committee to collect such evidence as would prove convincing to the Committee. The inquiry demonstrated everything that the industry has claimed for years past—namely, that it was not unduly favoured, that the profits made by canegrowers were exceedingly low, and that the industry was perfectly efficient. It was shown that the average profit to the Queensland canegrower was only 2·2 per cent., as against the 7 per cent. regarded as a fair and reasonable return. As regarded alien penetration, the whole Committee was able to declare that only 10 per cent. of those engaged in the industry were wholly foreign, and that of the sugar-mill hands 94 per cent. were British or Australian.

Apart from the recommendations, however, the report of the Committee is a valuable document which sets out a great many facts in relation to the industry which it is important to know. For some time to come it should be a mine of information on many details in connection with the growth and production of sugar. Many of the tables presented are of much value and interest, such as the following:—

(*a*) Statement of minimum wages paid for the years 1907 to 1930;

(*b*) Values of land used for sugar-growing;

(*c*) Aliens engaged in the sugar industry;

(*d*) Tables relating to by-products;

(*e*) Australian production and prices;

(*f*) Growers' cost of production tables;

(*g*) Raw sugar milling costs; and

(*h*) Sugar Board figures, &c.

It may now prove interesting to set out a few extracts from the Report of the Committee bearing on prices of raw sugar, &c.

The Majority report stated that, taking all the varied economic, technical, and climatic circumstances into consideration, they arrived at the conclusion that it would serve the interests of consumers best, and not be unjust to the sugar industry as a whole, to use as a basis the manufacturing costs of the Colonial Sugar Refining Company, Limited, for the last five years. Having adjusted these costs to include the actual sugar railage paid by all the mills other than those of the company, they adopted £5 11s. 3d. per ton as being a fair cost of manufacture of raw sugar.

The following is a summary of the costs of production of sugar-cane in Queensland for the years 1925 to 1928:—

—	Northern District.	Central District.	Southern District.	Whole State.
	s. d.	*s. d.*	*s. d.*	*s. d.*
Price received	40 0	41 11	36 6	40 0
Cost	36 9	38 3	37 9	37 5
Profit	3 3	3 8	..	2 7
Loss	..	..	1 3	..
Percentage profit	3·18%	3·12%	..	2.02%
Percentage loss	..	..	1·46%	..

The average profit of Queensland canegrowers for the whole industry from 1925 to 1928 was 2·02 per cent., as against the 7 per cent. return on capital which is commonly regarded as fair and reasonable. These four years happen to cover a period during which there were no exceptional climatic conditions, such as cyclones, &c., that would impose additional costs, or cause losses of capital and/or revenue.

The foregoing costs of sugar-cane have been combined with the milling costs, and the following statement shows how the present costs of production have been arrived at. These costs have also been borne out by personal investigations in the sugar districts.

Item.	Per ton cane. £ *s. d.*	Per ton raw sugar. £ *s. d.*
1. Cost of producing cane	1 17 5	
2. Less wage reductions for October and December, 1930 (estimated average)	0 1 5	
3. Cost of production of cane as at March, 1931 ..	1 16 0	
4. Converted to raw sugar	..	13 5 4
	Per ton raw sugar.	
5. Cost of manufacturing raw sugar	5 11 3	
6. Less wage reductions for October and December, 1930 (estimated average)	0 3 10	
		5 7 5
7. Cost of production of raw sugar as at March, 1931	..	£18 12 9

This present cost of £18 12s. 9d. per ton for raw sugar—which provides no profit (or interest) return on capital for either canegrowers or the mills—is the vital point on which the determination of the selling prices of refined sugar principally depends.

First of all, the average bare cost of raw sugar from 1925 (when over-production first became marked) to 1930, inclusive, will be compared with the prices received.

N.B.—The average bare cost for these years is assumed to be £19 7s. 4d. per ton, the October and December wage reductions of 14s. 7d. per ton of raw sugar, which will not affect costs until the 1931 season, having been added to our finding of the present costs of £18 12s. 9d.

—	Price Received.	Average Bare Cost.	Profit.	Loss.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1925	19 10 7	19 7 4	0 3 3	..
1926	24 10 10	19 7 4	5 3 6	..
1927	22 0 4	19 7 4	2 13 0	..
1928	20 17 11	19 7 4	1 10 7	..
1929	20 5 10	19 7 4	0 18 6	..
1930	18 17 6	19 7 4	..	0 9 10 (estimate)
Weighted average	21 2 2	19 7 4	1 14 10	..

The Committee considered that a minimum addition of 7 per cent. to canegrowers and raw sugar mills on capital invested in a tropical climate was but fair and reasonable; such return would, of course, be subject to income tax. The addition of 7 per cent. interest on capital to the bare cost of £18 12s. 9d. per ton for March, 1931, would increase that amount by £3 15s. per ton, making a present fair sale value of £22 7s. 9d. per ton. The relative fair sale value from 1925 to 1930 would have been £23 2s. 4d. per ton. Hence the average profit of £1 14s. 10d. per ton on the bare cost of £19 7s. 4d. shown in the table above was equivalent to only 3·27 per cent. on the joint capital invested by canegrowers and sugar-mills.

It was obvious that with the present fair sale value of £22 7s. 9d. per ton there were no grounds for the Committee to properly recommend an early reduction in the present Australian selling price. An average return of £20 per ton (even if realised), as against the present bare cost of £18 12s. 9d., would give the canegrowers and raw sugar mills an average return of only 2·54 per cent. on the joint capital invested.

The above statements were based on a production of which 40 per cent. is surplus production. If consideration were given to reducing sugar by ½d. a pound as a result of eliminating export losses, it would have to be based primarily on a higher cost of production (for overhead costs) than the £22 7s. 9d. per ton the Committee had decided on, for the reason that overhead costs would increase as the production decreased.

Dealing with the refining of sugar, the Majority report stated the earnings of the Colonial Sugar Refining Company were not excessive, and that the work of refining and distribution of sugar was carried out efficiently and at reasonable charges.

It was pointed out that a reduction of ½d. a lb. in the price of sugar directly consumed by each person in Australia would only amount to 3s. 5d. per annum. Nominally, each person would also save 1s. 6d. per annum on the sugar content of manufactured goods, but actually—owing to the fact that ½d. per lb. of sugar means much less than ½d. in the retail price of the standard size of the product that the housewife buys—very little of this extra saving of 1s. 6d. per annum could be passed on to consumers. Most of the 1s. 6d. would necessarily be shared by manufacturers, wholesale merchants, and retail grocers.

With ½d. per lb. reduction in the local price of sugar domestic consumers as a whole would save £1,050,000 per annum on their direct purchases; manufacturing consumers would save nearly £450,000 per annum, of which up to £150,000 might be passed on to domestic

consumers. Hence domestic consumers would save about £1,200,000 per annum on their sugar costs, which represents 3s. 11d. per annum per person.

In order to secure such a saving, it would be necessary to reduce production rigidly to home consumption requirements. This would involve a reduction of approximately 120,000 acres in the area now under cultivation. Forty per cent. less work would be available for sugar workers generally, and, in addition, persons who now obtain their living by serving the needs of those engaged in the sugar industry—e.g., shopkeepers, railwaymen, transport workers, seamen, and many others—would be seriously affected. The question then arises as to what could be done with surplus sugar lands and employees.

With regard to the sugar lands thus thrown out of production, it is certain that for many years nearly all this land would remain idle. Every agricultural expert in Queensland and New South Wales who gave evidence before the Committee declared that under prevailing circumstances, both agricultural and economic, only a small percentage of the sugar lands can be used for other agricultural purposes. Even regarding the sugar lands in the Northern Rivers of New South Wales, which are situated in the midst of prosperous dairying centres, convincing evidence was submitted by experts that it would be impracticable for more than about 20 per cent. of the lands now planted with sugar-cane to be used for other agricultural purposes.

In view of the fact that practically all of the staple exports from Australia are commodities which are frequently subject to world over-production, and for which a more or less unprofitable return is now being received, it is difficult to see what avenues of other employment could possibly be found for the men now directly or indirectly engaged in connection with the excess production of sugar.

As already stated, the present position with regard to sugar is that the surplus production has taken up the saving in costs due to better efficiency since 1922. This saving is the chief factor in providing a living for a large number of farmers and workers.

The average value of surplus sugar exported is about £2,000,000 per annum, of which nearly the whole is distributed in wages. A large proportion of this sum eventually finds its way to the Southern States for the purposes of purchasing clothing of all kinds, manufactured foodstuffs, and many other products of the South. The loss that consumers bear through not receiving the benefit of the reduction in the price that would be possible if the entire export surplus were eliminated, is indirectly recovered by them in the form of employment and the consequent circulation of money arising from the manufacture of those goods in the Southern States which are purchased by sugar producers and workers from the money received from the sale of export sugar. Admittedly, the reciprocal benefit just mentioned applies specially to New South Wales, Victoria, and Tasmania. South Australia and Western Australia naturally get a smaller share of this reciprocal trade, partly because of their geographical isolation and partly because they manufacture very few things which the sugar industry or the people in North Queensland require.

Apart from the people, directly and indirectly, who would lose their occupations in the event of Australian sugar production being reduced to home consumption requirements, there would be losses in the revenue of railways operating in the sugar districts, by shipping companies, and by the industries near the sugar districts, which now find a considerable market for their goods amongst sugar producers.

In addition to the above remarks, we are of the opinion that the £2,000,000 per annum that is made available in London in connection with the sale of surplus sugar is a distinct advantage to Australia during this difficult period in connection with her international trade balance. This advantage may not be so marked when Australia recovers from her present difficulties, but in the meantime it would appear to be undesirable to take any drastic action, with such scant advantage to the consumers, in the direction of suddenly reducing the production of sugar in Australia.

Nevertheless, we are strongly of opinion that there is no justification for any further increase in the Australian production for many years, and we consider that every effort should be made by the authorities to keep production within the present limits.

After carefully weighing all the issues involved, we take the view that the question of over-production is one that is bound up with high Government policy in regard to such matters as the White Australia policy, the development of the vulnerable Far North, land settlement, and the advisability or otherwise of a young sparsely populated nation deliberately destroying a considerable part of its present development.

If the Commonwealth Government is of the opinion that over-production should be gradually curtailed and reduced to home-consumption requirements, we consider that it would be reasonable for the Government to give adequate notice to the industry that, after a certain date, it must accept all the responsibiliy for the excess producion and be content with a reduced price for sugar sold for home consumption. In this regard, it is considered that it would be equitable to give three years' notice in advance of such a radical change of policy, having regard to the fact that much of the sugar is produced on the system of one plant crop and two ratoon crops therefrom, and that expenditure on cultivation already incurred would receive no return if the reduction had to be effected in a shorter period.

LAND VALUES.

The values of land accepted by the Committee were as under:—

Mossman to Ingham district ..	£30 per acre
Ayr district	£28 10s. per acre
Mackay district	£21 16s. per acre
Bundaberg district	£26 per acre

Values of land at inflated sale values were not allowed to enter the costs as adopted.

The aggregate value of all the Queensland canegrowers' assets was given as £19,478,571.

[TO BE CONTINUED.]

Bureau of Sugar Experiment Stations.

ENTOMOLOGICAL HINTS TO CANEGROWERS.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following entomological hints to canegrowers from Mr. E. Jarvis, Meringa:—

THE BEETLE BORER.

DURING the last few months applications for Tachinid flies have been received at Meringa Experiment Station, from Innisfail, Goondi, and elsewhere. In June last (1931) these districts and those of Mourilyan, Tully, and Cairns were supplied with more than 500 specimens of this useful parasite (*Ceromasia sphenophori* Vil.); our last liberation being made in July.

Since that date, however, seven further applications have come to hand for these Tachinid parasites, from growers at Aloomba, Pawngilly, Goondi, &c.

Farmers troubled with this weevil borer are asked to advise the Entomologist at Meringa in order that their names may be recorded and the parasites sent to them in due course. In places where liberations have been made, and the flies are thought to be established, care must be taken to keep those blocks found to be liable to such infestation free from an undergrowth of weeds or from litter of any kind, as, while these parasitic flies are believed to avoid such unclean situations, the beetle borer, on the other hand, finds these kind of conditions an ideal breeding ground. When growing choice varieties of cane for seed or other purposes it would be worth while "trashing" the sticks as a deterrent against attacks of these weevils, which being lovers of dense shade, dampness, and seclusion, frequently oviposit under loosened leaf-sheaths.

By keeping the lower portions of such canes free from trash, &c., one affords the parasites a better chance of locating the position of holes in the rind, through which their tiny maggots may reach the tunnelled portions of the stick containing borer grubs.

CONTROLLING LEAF-EATING "BRONZE BEETLE."

It is well to be on the lookout for the occurrence of the chrysomelid beetle (*Rhyparida morosa* Jac.), which may prove destructive to the shoots and leaves of cane.

Its small creamy-yellow grubs, which are about a quarter of an inch long, are found either in the soil against the basal portion of the stalks or in the central core of affected shoots, where by devouring the internal tissue they bring about death to the heart-leaves.

In the year 1927 great numbers of this insect appeared in the Atherton district, causing much injury to plantations of young maize. The beetle responsible for these little grubs is only three-sixteenths of an inch in length, being uniformly black with a tinge of bronze colour, shining, and of very convex shape. It eats small holes in the leaves of sugar-cane, blady grass, and other plants, and when occurring in numbers often attracts attention. Cane growing close to headlands is always more liable to injury than that forming the area of a block.

Simple methods of checking the activities of this cane pest are as follows:—Cut out "dead-hearts," severing such affected shoots at a point about 2 inches below ground level, and crush or burn same to destroy any larvæ or pupæ in the central tunnelled portion. Plough out blady grass on headlands. Collect the beetles when very plentiful by shaking infested blady grass or young cane over shallow pans containing water and a little kerosene. This must be practised at a time when these beetles are disinclined to fly, during dull cloudy days or early morning.

DUSTING CANE APHIDES.

Many growers are familiar with the appearance of the common cane aphis, or cane louse as it is often called, small soft-bodied, yellowish-green insects which now and then congregate in great numbers on the under surface of the lower leaves. Such occurrence generally remains unremarked until these insects increase sufficiently to promote development of a black fungus known as fumagine, which grows upon the sweet secretion scattered over the surface of the leaves by these aphides during the process of sucking up the sap. As a general rule such attack seldom assumed serious proportions until the heart-leaves become affected. Remedies for this leaf pest are—(1) Tobacco water, made by boiling about 1 lb. of black-plug tobacco in 4 gallons of water. Boil this until the water becomes the colour of strong tea, then strain through a fine mesh or gauze, and apply while quite warm in the form of a dense spray. (2) If dry spraying be more convenient, dust the leaves with "Nicoquick" by means of a suitable machine. The "Buzacott" junior dust gun, price 17s. 6d., should meet requirements, and can be obtained from this firm (Buzacotts (Qld.) Ltd., Adelaide street, Brisbane), together with any dusting powders needed. "Nicoquick" costs about 7½d. per lb., in tins of 25 lb.

FARM FERTILITY TRIALS.

RESULTS FOR THE 1931 SEASON.

By H. W. KERR.

The first set of farm fertility trials was harvested during 1930, *and the results therefrom were reported in Farm Bulletin No.* 1. *Many of the trials were re-fertilized at ratooning time—the treatments, in most cases, being identical with those applied to the plant crop. In addition, a new series of trials was set out on selected farms, and the results of all experiments harvested during* 1931 (*both plant and ratoon crops*), *are included in the present pamphlet.*

EXPERIMENTAL METHOD.

THE plots which were carried over as ratoons from the 1930 season were continued, of course, on the old plan, as described in Farm Bulletin No. 1. Early in the work we discovered weaknesses in the method of selection of individual treatments, and with the trials begun in 1930 a modified plan was adopted. This is exemplified by the following diagram:—

NK	PK	C	NPK	NP
NPK	C	NP	PK	NK
C	NK	PK	NP	NPK
NP	NPK	NK	C	PK
PK	NP	NPK	NK	C

It will be observed that instead of the N plots of the earlier layout a PK treatment is substituted, giving again a trial of 25 small plots. The significance of the above letters, and the method of determining the response to the individual constituents, is as follows:—

C represents plots which received no fertilizer treatment.

NP represents plots which received—
Sulphate of ammonia (N);
Superphosphate (P).

N K represents plots which received—
Sulphate of ammonia (N);
Muriate of potash (K).

P K represents plots which received—
Superphosphate (P);
Muriate of potash (K).

N P K represents plots which received—
Sulphate of ammonia (N);
Superphosphate (P);
Muriate of potash (K).

The weights of the individual substances employed in the above mixtures were varied from trial to trial, and the actual amounts taken are shown in the respective tables accompanying results.

Calculation of Results.

The object of all these experiments was simply to determine which constituents of the fertilizer mixtures contributed to any increased yield due to their use, and hence the relative proportions of each required in a suitable fertilizer mixture for the particular soil type. The method of determining these relative increases is as follows:—

Suppose we have the results of 25 individual plots from a trial. We may group the yields in series of five plots under their respective treatment headings, and by taking the average of each series we have a measure of the relative yields of the five treatments. Suppose we found—

C—25 tons cane per acre.
N P—34 tons cane per acre.
N K—29 tons cane per acre.
P K—33 tons cane per acre.
N P K—36 tons cane per acre.

It is evident that the difference in yield between the N P K plots and those receiving N P is due to the potash applied in the former treatment —that is—

N P K — N P = influence of potash; and here 36 — 34 = 2 tons per acre.

Similarly for the treatments N K and P K in comparison with N P K, we find as follows:—

Relative values of—

N (sulphate of ammonia)	..	3 tons per acre increase
P (superphosphate) ..	..	7 tons per acre increase
K (muriate of potash)	..	2 tons per acre increase

These results indicate the need for a fertilizer mixture rich in phosphates, and with relatively lesser amounts of nitrogen and potash.

In attempting to secure information along these lines it must be remembered that no attempt is made to select the most suitable proportions of these materials in preparing our mixtures for the field plots; nor is any attempt made to select an economical dressing per acre in order to show profitable returns. Our object is to determine simply the relative needs for the three ingredient plantfoods. It is not suggested

that the economic side of the question must be lost sight of—for this is necessarily the aspect of the work in which everybody is chiefly interested—but the determination of this factor must follow the present type of preliminary trial. That is, considering the above-quoted results once more, when we know that the crop shows a pronounced response to an application of superphosphate (in combination with lesser amounts of the other ingredients), we set out a further experiment with, say, 200, 300, 400, 500, and 600 lb. of superphosphate respectively, and then deduce which of the five selected amounts gives the maximum payable yield.

We feel that we are now beginning to learn something of the relative requirements of certain of our soil types, and during the coming season we will set out a number of trials of the latter type in an attempt to determine the economic limits to which the treatments may be pushed. The fact that, in compiling the results which follow, a financial statement of the treatment and yields has been prepared is simply in response to requests from many growers who would like to have a clear picture of the economic side of the work.

Generalised Results.

In the following pages a discussion of the results from individual trials is given. There are, however, a number of generalisations to which the results as a whole contribute, and it might be worth while considering these briefly.

Plant v. Ratoons.—Sixteen of the trials have now been harvested as plant and ratoon crops, and a comparison of the average response to the best treatment in each year shows the following:—

Average response to fertilizer on plant crop	..	5·6 tons cane
Average response to fertilizer on ratoon crop	..	7·7 tons cane

In other words, the same fertilizer treatment showed much better results on the ratoon crop than it did on the plant. This is, indeed, just what might be expected. Following a fallow, the accumulated plantfood may be sufficient for the production of a reasonable tonnage without the use of outside fertilizer supplies; but when the ratoons are forced to gather in what plantfood remains after the plant crop is harvested the need for an artificial mixture to supplement the soil supply is urgently required. This is in accordance with the general findings on our experiment stations, and it indicates clearly one method by which the ratoon yields may be maintained, instead of falling away suddenly as is so often the case.

Another method of presenting the results for those who are not consistent users of fertilizers is to compare the average yield of the *unfertilized* plant crop with the average ratoon yield from the fertilizer treatment which gave the *highest profit* from the use of fertilizer. We find—

Average yield unfertilized plant crop	..	21·6 tons
Average yield fertilized ratoon crop	..	20·1 tons

Although the fertilizer treatment taken in arriving at these results is probably not that best suited to the particular set of conditions, yet we find that the average first ratoon crop is only 1·5 tons of cane per acre lower than the unfertilized plant crop.

When considering which fertilizer ingredient is most instrumental in contributing to increased crop yields, we meet an interesting situation. With regard to phosphate and potash, we find that sometimes one, sometimes the other, is of special value, and frequently both are comparable in their relative importance. This is a question which is ultimately linked up with the soil type; thus we find that the red volcanic soil responds chiefly to potash, while the acid alluvial soils require heavy dressings of phosphates. With our nitrogenous manure, however, it is found that practically all soils so far examined are markedly deficient in available supplies of this plantfood. Although the plant crop may exhibit little response to nitrogen, the ratoons will almost certainly do so, and in many of the returns from ratoon plots the influence of sulphate of ammonia is outstanding.

This latter aspect of fertilizer requirement stresses the importance of growing and ploughing under leguminous crops during the fallowing period; for these crops supply an abundance of available nitrogen for the subsequent plant crop of cane, and the use of sulphate of ammonia may be confined almost to that of top dressing ratoons.

As was indicated earlier, no attempt has yet been made to determine the maximum application of sulphate of ammonia for most profitable returns, but it would appear that dressings of 400 lb. per acre or more will be quite reasonable applications for ratoons in certain of our areas. Of particular interest in this respect are the soils of the Burdekin area. The only treatment on plant crops which suggests increased yields in this district is an application of sulphate of ammonia, and it is almost certain that the ratoons will exhibit this effect in marked degree.

Influence of Fertilizer on C.C.S. in Cane.

Many farmers are of the opinion that the use of fertilizers will be detrimental to a high sugar content of the crop. That there is some influence in this regard is brought out by a study of our two years' crop results. The effect is confined principally to the use of sulphate of ammonia and potash. The former appears to delay ripening of the crop, while the latter accelerates maturity. Hence we find that with early harvested crops the N P treatment shows a definitely lowered c.c.s. value, while treatments embracing potash (K) are not seriously influenced; the delaying effect of N is counterbalanced by the K treatment. For crops harvested in mid-season, all treatments show comparable returns, in general, and for crops harvested late in the season, the delaying of maturity by fertilizing is often a decided advantage, for the cane on non-fertilized plots may be over-ripe by this time.

Basis for Calculation of Value of Crop Returns.

As the final net price to be paid for the past season's crop is not yet determined, the estimated value of £17 10s. has been taken as a basis for calculation. Fertilizer prices are based on Brisbane quotations plus freight to the individual districts, while an allowance of 10s. per acre has been made for the cost of application.

NORTHERN DISTRICTS.

Location.—**L. R. Hearn's farm, Mossman.**

Soil Type.—Alluvial soil on Mossman River.

Variety.—Badila. Age of crop—Ten months. Nature of crop—First ratoon.

RESULTS.

	No Fertilizer.	300 lb. Sulphate of Ammonia.	300 lb. Sulphate of Ammonia + 300 lb. Super-phosphate.	300 lb. Sulphate of Ammonia + 200 lb. Potash.	300 lb. Sulphate of Ammonia + 300 lb. Super-phosphate + 200 lb. Potash.
Tons cane per acre	11·1	15·7	14·3	17·2	16·1
C.C.S. in cane	..	..	..	..	..
Value of crop	£18 17 0	£26 14 0	£24 6 0	£29 5 0	£27 7 0
Less harvesting costs	£5 3 0	£6 2 0	£5 14 0	£6 13 0	£6 5 0
Return	£13 14 0	£20 12 0	£18 12 0	£22 12 0	£21 2 0
Increased return due to fertilizer	..	£6 18 0	£4 18 0	£8 18 0	£7 8 0
Cost of fertilizer and application	..	£2 15 0	£3 13 0	£4 4 0	£5 2 0
Profit from fertilizer	..	£4 3 0	£1 5 0	£4 14 0	£2 6 0

It was unfortunate that grubs did considerable damage to this trial, and the results were robbed of much of their value. They do, however, bear out those of the plant crop in that they show a very definite response to nitrogen. Although not harvested as a lime trial, the results from the lime application which preceded the plant crop were plainly evident in the ratoons.

Location.—**Pringle Brothers' farm, Mossman.**

Soil Type.—Recent alluvial soil on the Mossman River.

Variety—Badila. Age of crop—Eleven and a-half months. Nature of crop—First ratoon.

RESULTS.

	No. Fertilizer.	300 lb. Sulphate of Ammonia.	300 lb. Sulphate of Ammonia + 300 lb. Super-phosphate.	300 lb. Sulphate of Ammonia + 200 lb. Potash.	300 lb. Sulphate of Ammonia + 300 lb. Super-phosphate + 200 lb. Potash.
Tons cane per acre	12·7	23·2	26·4	24·0	22·2
C.C.S. in cane	17·8%	17·7%	17·7%	18·0%	17·7%
Value of crop	£28 2 0	£51 0 0	£58 2 0	£53 18 0	£48 17 0
Less harvesting costs	£5 11 0	£9 0 0	£10 5 0	£9 6 0	£8 12 0
Return	£22 11 0	£42 0 0	£47 17 0	£44 12 0	£40 5 0
Increased return due to fertilizer	..	£19 9 0	£25 6 0	£22 1 0	£17 15 0
Cost of fertilizer and application	..	£2 15 0	£3 13 0	£4 4 0	£5 2 0
Profit from fertilizer	..	£16 14 0	£21 13 0	£17 17 0	£12 13 0

The response to sulphate of ammonia on this trial is most outstanding. Its effects could be very readily detected early in the growth of the ratoon crop. There was a response to this constituent on the plant cane equal to about 4 tons of cane per acre. On the ratoons, however, this is increased to over 10 tons. This emphasises once more the absolute necessity for nitrogenous fertilizer on ratoons. A further interesting point is the fact that this crop, harvested at its peak of maturity, showed no falling off of c.c.s. due to the fertilizer, and cut out at an average of about 17·8 per cent. The average value of the increased crop was over £17 per acre.

Location.—**Messrs. Coulthard and Cox's farm, Saltwater, Mossman.**

Soil Type.—Alluvial soil; very acid, and of characteristic bleached colour.

Variety.—H.Q. 426. Age of crop—Fourteen and a-half months. Nature of crop—Plant cane.

RESULTS.

	No Fertilizer.	280 lb. Sulphate of Ammonia + 400 lb. Superphosphate.	280 lb. Sulphate of Ammonia + 200 lb. Potash.	400 lb. Superphosphate + 200 lb. Potash.	280 lb. Sulphate of Ammonia + 400 lb. Superphosphate + 200 lb. Potash.
Tons cane per acre	26·3	31·0	30·8	25·0	32·0
C.C.S. in cane	17·4%	17·4%	17·5%	18·0%	17·6%
Value of crop	£55 18 0	£65 18 0	£66 15 0	£56 3 0	£69 17 0
Less harvesting costs	£10 4 0	£12 0 0	£11 19 0	£9 14 0	£12 8 0
Return	£45 14 0	£53 18 0	£54 16 0	£46 9 0	£57 9 0
Increased return due to fertilizer	..	£8 4 0	£9 2 0	£0 15 0	£11 15 0
Cost of fertilizer and application	..	£4 18 0	£4 1 0	£4 15 0	£6 7 0
Profit or loss from fertilizer	..	Profit. £3 6 0	Profit. £5 1 0	Loss. £4 0 0	Profit. £5 8 0

Again, the outstanding feature of this third Mossman plot is the response to sulphate of ammonia. The increase in this case is about 7 tons of cane per acre. The soil type is a bleached alluvial, obviously highly deficient in humus. Indeed, the soil tests indicated an intense degree of acidity and the urgent need for liming. It is indeed a little surprising to find such a definite response to sulphate of ammonia under these conditions; in all probability the ill effects will be evident in the ratoons.

Location.—**W. Chapman's farm, Hambledon.**

Soil Type.—Red schist hillside slope.

Variety.—Badila. Age of crop—Fourteen and a-half months. Nature of crop—Plant cane.

RESULTS.

	No Fertilizer.	360 lb. Sulphate of Ammonia + 360 lb. Superphosphate.	360 lb. Sulphate of Ammonia + 200 lb. Potash.	360 lb. Superphosphate +200 lb. Potash.	360 lb. Sulphate of Ammonia + 360 lb. Superphosphate + 200 lb. Potash.
Tons cane per acre	33·0	36·8	41·1	35·1	40·4
C.C.S. in cane	16·7%	16·1%	16·7%	17·0%	16·8%
Value of crop	£57 15 0	£64 8 0	£71 19 0	£61 9 0	£70 14 0
Less harvesting costs	£12 16 0	£14 5 0	£15 19 0	£13 12 0	£15 13 0
Return	£44 19 0	£50 3 0	£56 0 0	£47 17 0	£55 1 0
Increased return due to fertilizer	..	£5 4 0	£11 1 0	£2 18 0	£10 2 0
Cost of fertilizer and application	..	£3 12 0	£4 9 0	£3 7 0	£5 19 0
Profit or loss from fertilizer	..	Profit. £1 12 0	Profit. £6 12 0	Loss. £0 9 0	Profit. £4 3 0

The red schist soil appears to be deficient in available nitrogen, despite a poor green manure crop which was ploughed under prior to planting. A slight increase due to potash is evident, but superphosphate has shown erratic results. It is anticipated that the results from the ratoons will be very interesting; soon after applying the sulphate of ammonia to the ratoons its effects were very evident.

Location.—**A. J. Kelly's farm, Aloomba.**

Soil Type.—Old alluvial soil of the Mulgrave River: land typical of much of the Aloomba country.

Variety.—B. 147. Age of crop—Fifteen months. Nature of crop—First ratoon.

RESULTS.

	No Fertilizer.	300 lb. Sulphate of Ammonia.	300 lb. Sulphate of Ammonia + 300 lb. Super-phosphate.	300 lb. Sulphate of Ammonia + 200 lb. Potash.	300 lb. Sulphate of Ammonia + 300 lb. Super-phosphate + 200 lb. Potash.
Tons cane per acre	14·0	25·5	25·1	23·7	26·4
C.C.S. in cane	15·8%	14·9%	14·8%	15·4%	16·0%
Value of crop	£26 12 0	£44 17 0	£43 14 0	£43 11 0	£51 1 0
Less harvesting costs	£5 12 0	£9 18 0	£9 15 0	£9 4 0	£10 5 0
Return	£21 0 0	£34 19 0	£33 19 0	£34 7 0	£40 16 0
Increased return due to fertilizer	..	£13 19 0	£12 19 0	£13 7 0	£19 16 0
Cost of fertilizer and application	..	£2 5 0	£3 3 0	£3 14 0	£4 12 0
Profit from fertilizer	..	£11 14 0	£9 16 0	£9 13 0	£15 4 0

The slight results from sulphate of ammonia obtained in the plant crop were very considerably magnified in the first ratoons. In fact, the result from superphosphate shown on the plant was not reproduced in the ratoons. It would be interesting to determine what could be done with Badila on this land, judging from the results on both plant and ratoon crops with B. 147. It is considered that this land is too poor for Badila, but probably adequate fertilizing combined with good cultivation would result in highly profitable returns from our premier variety.

Location.—**J. H. Jackson's farm, Babinda.**

Soil Type.—Gravelly loam (granitic).

Variety.—Badila. Age of crop—Thirteen months. Nature of crop—Plant cane.

RESULTS.

	No Fertilizer.	240 lb. Sulphate of Ammonia + 360 lb. Super-phosphate.	240 lb. Sulphate of Ammonia + 140 lb. Potash.	360 lb. Super-phosphate + 140 lb. Potash.	240 lb. Sulphate of Ammonia + 360 lb. Super-phosphate + 140 lb. Potash.
Tons cane per acre	27·2	31·2	30·1	27·6	32·4
C.C.S. in cane					
Value of crop	£47 12 0	£54 12 0	£52 14 0	£48 6 0	£56 14 0
Less harvesting costs	£10 11 0	£12 2 0	£11 13 0	£10 14 0	£12 11 0
Return	£37 1 0	£42 10 0	£41 1 0	£37 12 0	£44 3 0
Increased return due to fertilizer	..	£5 9 0	£4 0 0	£0 11 0	£7 2 0
Cost of fertilizer and application	..	£2 18 0	£2 19 0	£2 11 0	£3 19 0
		Profit.	Profit.	Loss.	Profit.
Profit or loss from fertilizer ..	..	£2 11 0	£1 1 0	£2 0 0	£3 3 0

This granitic gravel soil has confirmed earlier results from this type—a distinct response to the use of sulphate of ammonia, which is as would be anticipated, having in mind the definite deficiency in humus content of the gravelly loams. This is a most important fact to keep in mind, even on "new" lands of this type. The particular block of land had just been brought under the plough for the first time.

Location.—**R. Matthews' farm, Pawngilly.**

Soil Type.—Alluvial soil, typical of much of the Russell River area. Tests showed the soil to be very acid and in need of a heavy lime dressing.

Variety.—Badila. Age of cane—Twelve months. Class of cane—First ratoon.

Results.—The experimental block showed outstanding results from the use of lime and superphosphate in the plant crop (harvested 1930).

For the ratoons, the block was uniformly fertilized, and at harvesting time only the effect due to the lime dressing was determined. These showed—

No lime	24·9 tons cane per acre
One and a-half tons burnt lime per acre..	27·6 tons cane per acre
Increase	2·7 tons cane per acre

The net increase for the two crops has been 8·4 tons of cane for an application of 1½ tons of burnt lime.

Location.—**J. A. Wolff's farm, South Johnstone.**

Soil Type.—The red schist soil of the area, adjacent to the red volcanic, with which it is often confused.

Variety.—Badila. Age of crop—Twelve months. Nature of crop—First ratoon.

RESULTS.

	No Fertilizer.	300 lb. Sulphate of Ammonia.	300 lb. Sulphate of Ammonia + 300 lb. Superphosphate.	300 lb. Sulphate of Ammonia + 240 lb. Potash.	300 lb. Sulphate of Ammonia + 300 lb. Superphosphate + 240 lb. Potash.
Tons cane per acre	24·8	24·5	30·2	29·5	33·4
C.C.S. in cane	14·9%	15·1%	14·6%	15·1%	14·8%
Value of crop	£43 12 0	£43 18 0	£51 14 0	£52 17 0	£58 6 0
Less harvesting costs	£9 12 0	£9 10 0	£11 14 0	£11 9 0	£12 19 0
Return	£34 0 0	£34 8 0	£40 0 0	£41 8 0	£45 7 0
Increased return due to fertilizer	..	£0 8 0	£6 0 0	£7 8 0	£11 7 0
Cost of fertilizer and application	..	£2 5 0	£3 3 0	£4 3 0	£4 18 0
Profit or loss from fertilizer ..	..	Loss. £1 17 0	Profit. £2 17 0	Profit. £3 5 0	Profit. £6 9 0

In this block we encounter a soil where the influence of a deficiency in available potash and superphosphate appears to overshadow any influence of the sulphate of ammonia. The latter substance employed alone has indeed shown no results, but it is most probable that its effects are felt in combination with potash and superphosphate.

Location.—**W. Jones's farm, Silkwood.**

Soil Type.—Acid alluvial soil, typical of the area. Tests showed need for lime and phosphate.

Variety.—Badila. Age of crop—Twelve months. Nature of crop—First ratoon.

RESULTS.

——	No Fertilizer.	360 lb. Sulphate of Ammonia.	360 lb. Sulphate of Ammonia + 300 lb. Super-phosphate.	360 lb. Sulphate of Ammonia + 180 lb. Potash.	360 lb. Sulphate of Ammonia + 300 lb. Super-phosphate + 180 lb. Potash.
Tons cane per acre	13·1	14·8	22·2	15·1	22·2
C.C.S. in cane	..	..	..	..	..
Value of crop	£22 5 0	£25 3 0	£37 15 0	£25 13 0	£37 15 0
Less harvesting costs	£5 8 0	£5 18 0	£8 12 0	£5 17 0	£8 12 0
Return	£16 17 0	£19 5 0	£29 3 0	£19 16 0	£29 3 0
Increased return due to fertilizer	..	£2 8 0	£12 6 0	£2 19 0	£12 6 0
Cost of fertilizer and application	..	£2 12 0	£3 10 0	£3 19 0	£3 17 0
Profit or loss from fertilizer ..	..	Loss. £0 4 0	Profit. £8 16 0	Loss. £1 0 0	Profit. £8 9 0

The results from this block closely parallel those obtained for the plant crop. Again we find a very pronounced response to superphosphate with apparently little increase from the employment of other manures. A warning should be issued that in all probability the nitrogenous manure is showing results in combination with superphosphate. It was one of the weaknesses of our earlier type of trial that this influence was masked by the choice of treatments.

Location.—**F. N. King's farm, Jaffa.**

Soil Type.—Gravelly loam (granitic).

Variety.—Badila. Age of crop—Thirteen and a-half months. Nature of crop—Plant cane.

RESULTS.

——	No Fertilizer.	240 lb. Sulphate of Ammonia + 360 lb. Super-phosphate.	240 lb. Sulphate of Ammonia + 180 lb. Potash.	360 lb. Super-phosphate + 180 lb. Potash.	240 lb. Sulphate of Ammonia + 360 lb. Super-phosphate + 180 lb. Potash.
Tons cane per acre	39·6	41·4	38·7	41·1	43·1
C.C.S. in cane	15·2%	14·3%	15·0%	15·1%	15·0%
Value of crop	£71 12 0	£68 13 0	£68 14 0	£73 13 0	£76 10 0
Less harvesting costs	£15 7 0	£16 1 0	£15 0 0	£15 19 0	£16 14 0
Return	£56 5 0	£52 12 0	£53 14 0	£57 14 0	£59 16 0
Increased or decreased return due to fertilizer	..	Decrease. £3 13 0	Decrease. £2 11 0	Increase. £1 9 0	Increase. £3 11 0
Cost of fertilizer and application	..	£2 19 0	£3 4 0	£2 17 0	£4 5 0
Loss from fertilizer		£6 12 0	£5 15 0	£1 8 0	£7 16 0

This block had been brought under the plough for the first time prior to the planting of the present crop. Though the increase in crop yield was not sufficient to cover the cost of fertilizer, the indications are again very evident that nitrogenous manures are required on the gravelly loams. The returns are somewhat erratic, but a deficiency in phosphates is also indicated. More definite results are anticipated in the ratoons.

Location.—**A. Cousin's farm, Feluga.**

Soil Type.—Gravelly loam (granitic).

Variety.—Badila. Age of crop—Thirteen months. Nature of crop—Plant cane.

RESULTS.

——	No Fertilizer.	240 lb. Sulphate of Ammonia + 360 lb. Super-phosphate.	240 lb. Sulphate of Ammonia + 180 lb. Potash.	360 lb. Super-phosphate + 180 lb. Potash.	240 lb. Sulphate of Ammonia + 360 lb. Super-phosphate + 180 lb. Potash.
Tons cane per acre	19·5	30·0	26·5	32·5	24·7
C.C.S. in cane	15·4%	16·4%	15·8%	15·9%	16·8%
Value of crop	£35 17 0	£59 18 0	£50 9 0	£62 6 0	£50 15 0
Less harvesting costs	£7 11 0	£11 13 0	£10 5 0	£12 12 0	£9 11 0
Return	£28 6 0	£48 5 0	£40 4 0	£49 14 0	£41 4 0
Increased return due to fertilizer	..	£19 19 0	£11 18 0	£21 8 0	£12 18 0
Cost of fertilizer and application	..	£2 19 0	£3 4 0	£2 17 0	£4 5 0
Profit from fertilizer	..	£17 0 0	£8 14 0	£18 11 0	£8 13 0

Due to the high degree of soil variability on this block, the returns are inconclusive. There does appear to be a definite response to sulphate of ammonia, however, which might have been expected. This land was also recently stumped and ploughed for the first time before the present crop. The removal of large stumps was undoubtedly responsible for much of the irregularity in yield from plot to plot.

Location.—**S. J. French's farm, Midgenoo.**

Soil Type.—Gravelly loam (granitic).

Variety.—Badila. Age of crop—Eleven months. Nature of crop—Second ratoon.

RESULTS.

——	No Fertilizer.	300 lb. Sulphate of Ammonia.	300 lb. Sulphate of Ammonia + 300 lb. Super-phosphate.	300 lb. Sulphate of Ammonia + 120 lb. Potash.	300 lb. Sulphate of Ammonia + 300 lb. Super-phosphate + 120 lb. Potash.
Tons cane per acre	21·5	25·1	27·3	25·1	29·0
C.C.S. in cane	..	..	..	..	..
Value of crop	£36 11 0	£42 13 0	£46 8 0	£42 13 0	£49 6 0
Less harvesting costs	£8 7 0	£9 15 0	£10 12 0	£9 15 0	£11 5 0
Return	£28 4 0	£32 18 0	£35 16 0	£32 18 0	£38 1 0
Increased return due to fertilizer	..	£4 14 0	£7 12 0	£4 14 0	£9 17 0
Cost of fertilizer and application	..	£2 5 0	£3 8 0	£3 3 0	£4 1 0
Profit from fertilizer	..	£2 9 0	£4 9 0	£1 11 0	£5 16 0

This block has now reached the stage of second ratoons, and the plantfood deficiency begins to show up in an unmistakeable manner. Nitrogenous manure showed the greatest response, but superphosphate is beginning to produce its effects.

[TO BE CONTINUED.]

AGRICULTURE ON THE AIR.

RADIO LECTURES ON RURAL SUBJECTS.

ARRANGEMENTS have been completed with the Australian Broadcasting Company for the regular delivery of radio lectures from Station 4QG, Brisbane, by officers of the Department of Agriculture and Stock.

On Tuesdays and Thursdays of each week, as from 1st March, a fifteen minutes' talk, commencing at 7.30 p.m., will be given on subjects of especial interest to farmers.

Following is the full list of lectures already arranged, and readers will observe the comprehensive field in the science and practice of agriculture, animal husbandry, and rural economics covered by the subjects chosen:—

SCHEDULE OF LECTURES

BY OFFICERS OF THE DEPARTMENT OF AGRICULTURE AND STOCK.

RADIO STATION 4QG, BRISBANE (AUSTRALIAN BROADCASTING COMPANY).

Tuesday, 1st March, 1932—"Cotton Experimental Work." W. G. Wells, Cotton Specialist.

Thursday, 3rd March, 1932—"The Farmer and His Market." J. F. F. Reid, Editor, "Queensland Agricultural Journal."

Tuesday, 8th March, 1932—"The Honey Bee." H. Hacker, Entomologist.

Thursday, 10th March, 1932—"Eradication of Disease in Pigs." J. A. Rudd, L.V.Sc., Government Veterinary Surgeon.

Tuesday, 15th March, 1932—"Curing of Tobacco." R. A. Tarrant, Instructor in Agriculture.

Thursday, 17th March, 1932—"Grading of Tobacco." R. A. Tarrant, Instructor in Agriculture.

Tuesday, 22nd March, 1932—"The Control of the Bronze Orange Bug." R. Veitch, B.Sc., Chief Entomologist.

Thursday, 24th March, 1932—"Classing the Clip for Market." J. Carew, Senior Instructor in Sheep and Wool.

Tuesday, 29th March, 1932—"Future Prospects of the Pig Industry." E. J. Shelton, H.D.A., Senior Instructor in Pig Raising.

Thursday, 31st March, 1932—"The Experimentalist and the Pig Farmer." L. A. Downey, H.D.A., Instructor in Pig Raising.

Tuesday, 5th April, 1932—"The Wheat Industry." R. E. Soutter, Manager, State Farm, and Wheat Experimentalist, Roma.

Thursday, 7th April, 1932—"The Maize Industry." C. J. McKeon, Instructor in Agriculture.

Tuesday, 12th April, 1932—"Propagation of New Varieties of Wheat." R. E. Soutter, Manager, State Farm, and Wheat Experimentalist, Roma.

Thursday, 14th April, 1932—"Maize, Crop Seed and Selection." C. J. McKeon, Instructor in Agriculture.

Tuesday, 19th April, 1932—"The Suitability of Wheat Varieties for Particular Areas." R. E. Soutter, Manager, State Farm, and Wheat Experimentalist, Roma.

Thursday, 21st April, 1932—"Financial Results of Farming." J. F. F. Reid, Editor, "Queensland Agricultural Journal."

Tuesday, 26th April, 1932—"Fallowing and Cultivation of Wheat." R. E. Soutter, Manager, State Farm, and Wheat Experimentalist, Roma.

Thursday, 28th April, 1932—"Market Gardening in Queensland." H. Barnes, Instructor in Fruit Culture.

Tuesday, 3rd May, 1932—"Useful Introduced Grasses" (First Lecture). G. B. Brooks, Director of Agriculture.

Thursday, 5th May, 1932—"Useful Introduced Grasses" (Second Lecture). G. B. Brooks, Director of Agriculture.

Tuesday, 10th May, 1932—"Poultry Breeding." J. J. McLachlan, Poultry Inspector.

Thursday, 12th May, 1932—"The Brown Vegetable Weevil." J. A. Weddell, Assistant Entomologist.

Tuesday, 17th May, 1932—"Meat Hygiene, History and Development" (First Lecture). H. G. Cheeseman, Senior Inspector of Slaughter-houses.

Thursday, 19th May, 1932—"Meat Hygiene, History and Development" (Second Lecture). H. G. Cheeseman, Senior Inspector of Slaughter-houses.

Tuesday, 24th May, 1932—"The Cattle Poisoning Sawfly." F. H. S. Roberts, M.Sc., Entomologist.

Thursday, 26th May, 1932—"Marketing of Primary Products" (First Lecture). A. E. Gibson, Senior Instructor in Agriculture.
Tuesday, 31st May, 1932—"Marketing of Primary Products" (Second Lecture). A. E. Gibson, Senior Instructor in Agriculture.
Thursday, 2nd June, 1932—"The Pruning of Fruit Trees." W. J. Ross, Senior Instructor in Fruit Culture.
Tuesday, 7th June, 1932—"Preparation of Land for Cotton Growing." R. W. Peters, Cotton Experimentalist.
Thursday, 9th June, 1932—"The Value of the Nut Industry, with Special Reference to the Queensland Nut and the Pecan Nut." H. Barnes, Instructor in Fruit Culture.
Tuesday, 14th June, 1932—"Soils and Their Relationship to Cane Culture" (First Lecture). Dr. H. W. Kerr, M.Sc., Ph.D., Sugar Soil Chemist.
Thursday, 16th June, 1932—"Soils in Their Relationship to Cane Culture" (Second Lecture). Dr. H. W. Kerr, M.Sc., Ph.D., Sugar Soil Chemist.
Tuesday, 21st June, 1932—"Soils in Their Relationship to Cane Culture" (Third Lecture). Dr. H. W. Kerr, M.Sc., Ph.D., Sugar Soil Chemist.
Thursday, 23rd June, 1932—"Soils in Their Relationship to Cane Culture" (Fourth Lecture). Dr. H. W. Kerr, M.Sc., Ph.D., Sugar Soil Chemist.
Tuesday, 28th June, 1932—"Incubation." P. Rumball, Poultry Expert.
Thursday, 30th June, 1932—"Immunisation of Calves against Blackleg Disease." St. G. Thorn, Assistant Bacteriologist.

ABSTRACTS AND REVIEWS.

"Agricultural Research in 1930."

Royal Agricultural Society of England. Price, 1s. 3d. Post Free. 201 pages.

The sixth volume of this annual summary of scientific and economic research work in agriculture, covering investigations conducted not only at home but abroad in so far as colonial and foreign results are of interest to agriculturists in this country, has now been issued. Started by the Research Committee of the Royal Agricultural Society of England quite frankly as an experiment, the publication has now established for itself a definite place in the periodical literature of the farming industry. Its principal object is to give the farmer a digest of the research work of the year, comprised within two covers and written in language he can understand. He has not the time to read the multiplicity of journals and pamphlets in which research workers must necessarily embody the results of their work, which are thus too long in being translated into action on the farm. Collected from all available sources, put together by acknowledged authorities in non-scientific language, the contents of "Agricultural Research" should be studied by all those who wish to keep themselves abreast of the times in modern agricultural practice.

It is impossible to do more than to give some indication of the subjects dealt with in the new issue. In the section on "Crops and Plant-breeding," contributed this year by Professor R. G. Stapledon, special emphasis is given to problems of grassland, both the renovation of poor grazings, and the best means of establishing new grass. These matters are of particular importance at the present time, when grassland farming is once again the sheet anchor of many farmers. Mr. James Mckintosh has many useful notes on research in "Dairy Husbandry," ranging from the problem of maintaining disease-free dairy stock, and taints and flavours in milk, to such very practical questions as the value of milk a sa food. Mr. Orwin's article on "Agricultural Economics" deals amongst other things with dairying from the production side, and there are notes on the economics of sugar beet and other crops, and on the progress of co-operation. In these days of low prices and high costs, when the use of machinery for labour saving is so much under discussion, the section on "Agricultural Engineering," contributed this year by Mr. S. J. Wright, who was in charge of the society's tractor trials last year, will receive particular attention.

Dr. Crowther deals once more with "Animal Nutrition," and Sir John Russell with "Soils and Fertilizers," prefacing his article with an interesting statistical summary of the nation's requirements and supplies of food. r. Minett has much to say of interest to cowkeepers, flockmasters, and poultrymen in his contribution on "Veterinary Science." Amongst these particular attention may be directed to the treatment of milk fever and recent discoveries concerning lungIworms in sheep and pigs.

For the assistance of students and others desirous of consulting original sources of information, each section of "Agricultural Research" concludes with a complete bibliography of papers quoted. The Royal Agricultural Society, it should also be noted, is continuing the sale of the volume at the reduced price of 1s. 3d. post free in order to secure the widest possible circulation.

FARMERS' SHEEP AND WOOL.

By J. CAREW, Senior Instructor in Sheep and Wool.

(*Continued from the January issue.*)

PART VIII.

This is the eighth article of a series planned for the purpose of supplying information sought from time to time by readers interested in sheep and wool; and also with the hope of stimulating interest in sheep-raising in Queensland on relatively small holdings.

FEEDING LAMBS AT RODNEY DOWNS.

DRY seasons had the effect of reducing the pasture to such an extent that in order to save the ewes the lambs were taken off when about three weeks old and hand fed. This feeding was carried out in a thoroughly efficient manner. The food was weighed out in a proper ration composed of bran, maize meal and lucerne chaff, which was damped down in mixing. Access to a rack of bush hay assisted greatly in the progress of the lambs from the time they were six weeks old. This hay was cut on the property from Mitchell grass, and was protected with a galvanised iron roof which rested on the stack, but could be raised or lowered as required by means of a convenient tackle attached to the top of the long upright poles as shown in Plate 35.

PLATE 35.—MITCHELL GRASS HAY UNDER COVER.

The lambs were drafted into mobs of about 350. Each mob was as near the same size as possible, and in similar condition; even "cot cases" were included.

Mr. J. V. Shannon had every reason to feel gratified at the success which attended his efforts, for few lambs were lost and most of them developed well. They were well grown at four months when they were shorn, and were strong enough to be driven to the railway where they were trucked for agistment, thus securing practically the whole of the lamb drop for the year; besides giving the ewes every chance to fend for themselves. The troughs were made by running wires through bags and securing them to forked posts as illustrated. A wire stretched directly over the feed troughs prevented the lambs from jumping across or into them in their eagerness to get at the food.

Plate 36.—The "Hospital" Pen.

Plate 37.—Weaners Feeding from Bag Troughs.

SHEARING THE SHEEP.

The time of shearing should be arranged in accordance with local conditions and requirements, when the season most suitable has been decided. Fine weather and dry sheep are matters of importance.

The mob drafted for shearing should be held under shelter overnight, then enclosed in a convenient pen for catching and brought to a clean shearing board on which they are to be shorn. There are many points which practice alone can teach whether the sheep be shorn by blades or machines. First, the sheep should be placed in an upright sitting position supported by the shearer's knees. The first blow is struck on the brisket, then working downwards, taking off the whole of the belly wool. While doing so the front legs should be lifted and held elevated by being placed behind the shearer's left arm. When the crutch is reached the legs can be released and the body allowed to fall back a little—clean the crutch and the inside of both hind legs, and if preferred the outside of the left leg.

The shearer should then place his right foot between the hind legs of the sheep, then draw the sheep upright and grip back and brisket between the knees. Draw the head of the sheep back, over the thigh, and hold it in position, with the elbow, while the wool is drawn back from the brisket, until an opening is made. With the left hand get a hold of the sheep by the muzzle and draw the head back over the left thigh. Turn the head away and open the neck by continuing from the brisket

PLATE 38.

SHOWING THE ADVANTAGE OF A STRETCHED WIRE OVER THE CENTRE OF THE TROUGH.

to the right ear close to the skin and then break away the wool. Work around under the jaws, at the same time allowing the head to return to its normal position, continue down the side of the neck to the left shoulder. The front portion of the foreleg can be shorn with the hand pressing the unshorn wool back; then lift the leg and clean it up. The position of the sheep may now be altered to half inclining on its right side or completely extended on the floor practically on its back. In the former position the operator works from the belly across the body over the backbone and tail; in the latter position the long blow can be used—that is, from hind to front quarter, finishing up along but over the backbone and tail.

The shearer should then turn, placing a foot at each side of the sheep, which is lying full length on its side. Draw the head of the sheep back over its left shoulder, clean the head and then work down the neck to the right shoulder. When this is reached the body should be partly lifted and the head gripped between the knees and the shearing continued over the shoulder. Lift the leg with the left hand and clean it, allowing the head of the sheep to pass through between the legs and balance the sheep with the body extended away from the operator, which makes the skin taut when the wool is more easily shorn. It also allows for the wool to fall away as soon as cut. The shearer now works across the body from the shorn

Plate 39.—Yarded for Shearing. Isis Downs, Central Queensland.

surface along the backbone to the belly, working down what is termed the whipping side. As the shearing proceeds the wool falls to the floor, tip side down. When the flank is reached the head of the sheep is lifted up to rest on the shearer's knees, and the left side of the body allowed to rest on the floor. When the flank is reached the leg is straightened out by pressure at the joint to prevent the sheep drawing its leg back against the shears or cutter. The fleece is separated from the sheep, finishing near the tail. Should any of the skin go with the fleece the wound should be dressed with some disinfectant, which should be kept handy for that purpose.

[TO BE CONTINUED.]

BUTTER FACTORY PAYS.

Factory pays vary from month to month, and in order to determine the true value of the supplier's product, the average price paid per pound over the period of twelve months must be regarded as the basis, said the Minister for Agriculture (Mr. H. F. Walker) in discussing the matter of butter factory pays.

An analysis of the operations of the various companies operating in Queensland, as disclosed by their balance-sheets, allows of a comparison being made of such operations, and the return to suppliers for their product.

Comparisons are sometimes misleading unless essential factors influencing the value of the product are taken into account.

The payment for the product of the dairy farmer is influenced by the geographical position of the factory, the extent of its output, transport facilities, and marketing conditions.

Climatic conditions are an all-important factor affecting the quantity of cream offering from month to month, unfavourable conditions decreasing the output, and consequently increasing proportionately the factory's operating cost per pound. A factory located in a zone favoured by weather conditions that ensure a uniform output throughout the year is in a position to return a higher rate of pay than a manufacturing centre located in a drier zone.

Manufacturing centres far removed from local markets and port are at a disadvantage as compared with the older manufacturing companies located near centres of large population and convenient to port.

The balance-sheets disclose that a number of companies pay considerable sums for the railage and cartage of cream to the factories, while other companies take delivery on the factory platform. The comparison of the pays of the respective companies can be determined only by taking into consideration this factor. Indeed, it appears as if it is overlooked in some instances when comparisons are being made.

In the final distribution, it is noted that some associations have made deferred pays at the end of the year. These have also to be taken into account when determining the average pays paid by associations during any period of twelve months.

If each and every factor is not taken into consideration, it will be found that in some instances the comparisons are misleading.

In making an analysis of the operations in respect to pays, the principal companies operating in the State have been grouped in geographical zones. From a perusal of the tabulated particulars, it will be seen that there is very little variation in factory pays within each group:—

		s.	d.	
Group A—				
A	.. ..	1	0.63	Railage and cartage not paid.
B	.. ..	1	0.46	Railage and cartage paid.
C	.. ..	1	0.44	" " "
D	.. ..	1	0.35	" " "
Group B—				
A	.. ..	1	1.35	Railage only paid.
B	.. ..	1	1.2	Railage and cartage not paid.
C	.. ..	1	1.09	" " "
Group C—				
A	.. ..	1	1.3	" " "
B	.. ..	1	1.01	" " "
C	.. ..	1	1.23	" " "
Group D—				
A	.. ..	1	0.93	" " "
B	.. ..	1	0.6	" " "
C	.. ..	1	0.55	" " "
D	.. ..	1	0.63	" " "
E	.. ..	1	0.58	" " "

A NEW AUTOMATIC DRENCHER.

SHEEPMEN who prefer drenches of the arsenical and bluestone type, because of their proved efficiency, will be interested to learn of the introduction to the market by Mr. W. Gasteen of "Thrushton," St. George, a sheepraiser himself, of the "Thrushton Automatic Drencher" which is designed for administering drenches of this kind, and which will make the irksome and unpleasant work of drenching both quick and easy. The chief advantages of the drencher are—

(1) The operator can always be sure that the measure is full and the correct dose is being supplied to the sheep.

(2) Waste is eliminated.

(3) Labour is saved, and work is accelerated, and it is possible for a boundary rider or small grower to drench his entire flock unaided.

(4) The construction of the drencher is strong and foolproof, and there are no parts to get out of order.

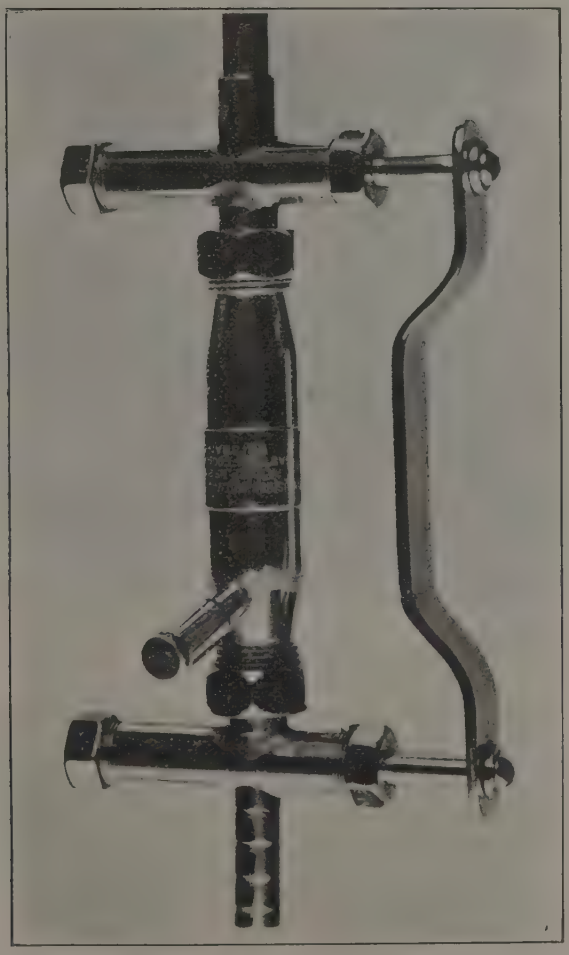


Plate 40.—Hand Piece and Dose Container.

The function of the drencher is to measure accurately and supply continuously any required quantity of liquid by one movement of one level only, and this is effected by connecting the plunger heads so that the pressure of the lever discharges the dose, and on its release the lever returns to the charging position, and the drencher is automatically recharged.

PLATE 41.—THE DRENCHER IN ACTION.

The Drenching Outfit.

The drencher works on the gravity-fed system. The liquid can be supplied to the drencher by the following methods:—

(1) Through a hosepipe from a supply reservoir holding 2 gallons and carried on the back, or

(2) From a drum of larger capacity, suspended at a convenient height and connected to one or more drenches by hose-piping. This method is suitable when drenching is carried out in bush yards or a square yard. When drenching is carried out in a race, it is suggested that high posts could be erected at each end and a wire rope stretched tight between them. The reservoir could then travel along the rope on a pulley and follow the men working. Either type of reservoir should be fitted with a tap.

The portable reservoir (of material which will withstand the action of the chemicals), hose-pipe, and straps may be purchased with the drencher if required, and this reservoir is so constructed that it has no corners and fits comfortably to the shape of the back.

The Apparatus in Action.

After connecting the reservoir to the drencer, fill reservoir, open tap on hose-line, and wait until the air in the hose-line and the drencher has been expelled by the liquid. This is indicated when the hissing of the escaping air ceases and the float-valve seats with a slight but distinct thud.

The measure between the plungers being now full, the nozzle is inserted in the sheep's mouth and the lever pressed, and the dose discharged, assisted by air entering through the float-valve. The valves are so adjusted that it is impossible for the lower valve (which releaess the dose) to commence to open until the top valve (which shuts off the supply) has completely closed.

Plate 42.—The Complete Kit showing Reservoir or Supply Tank on the Back of the Operator.

The level is released when the dose has been discharged, and springs set behind the plungers, and inside the plunger casing, return the valves so that another dose flows quickly into the drencher. The trapped air is released (by the float-valve) with the hissing sound ending in the slight but distinct thud, as the valve seats after all the air has been emitted and the measure has been refilled with liquid. There is no possibility of the drencher supplying any but the full dose, provided the operator waits for the valve to seat. The valve will seat before the fastest operator is ready to treat his next sheep.

Two measures are supplied with the drencher, viz., 2 oz. and 1 oz., as these are the quantities in most common use. Measures of other sizes can be supplied if required.

To change measures, screw out measure and screw in the one required (a spanner being provided with the set for the purpose), taking care that connections are tight.

The valves and barrel (measure) can be turned into line independently, as free lateral movement is possible at all times, but a slight loosening of the connections will assist in this operation. When the drencher is in use the float-valve should always be as nearly vertical as possible.

In practice, owing to the pace at which the drencher discharges and recharges, it will be found when drenching undrafted ewes and lambs, that the 1-oz. measure will be used, two doses being given to the ewe and one to the lamb, as the second dose could be given to the ewe before she had time to swallow the first. This avoids the necessity of drafting the sheep, or changing measures.

To clean the drencher, disconnect the lever, open both valves, and flush with hot water.

Construction of the Drencher.

The drencher is constructed entirely of brass, finished in nickel, and is designed for administering liquid drenches of arsenical or bluestone type, or any other type of liquid drench where a dose of 1 oz. or more is required.

"Standard Arsenical and Bluestone Drench," which can be supplied with the drencher, is recommended, and is packed in quantities sufficient for 400 sheep where the dose is 2 oz. per sheep.

The drencher is a labour saver, a time saver, and a sheep saver.

The drencher is entirely a Queensland product, manufactured locally by Messrs. Preston and Dalby, engineers, Brisbane, and is distributed in Queensland, by the Queensland Chemical Distributing Company, Perry House, Elizabeth street, Brisbane.

We have seen this drencher in use and consider it the most useful type yet produced.

It is a time-saver of the first order—clean, strong, durable, light, and convenient to handle. It saves the measuring, refilling, and much waste of time struggling amongst the sheep. This drencher will fill a long-felt want and should prove a vast improvement on the system where the larger doses such as the arsenical and bluestone drenches are administered.

PIGS DO NOT NEED MILK.

BORTHWICK'S TESTS SHOW GOOD RESULTS.

Messrs. Thomas Borthwick and Sons (Australia), being large exporters of pork from Queensland and New Zealand, are greatly interested in the continuance and prosperity of the pig industry, and realising the importance of regularity of supplies of porkers, this firm has engaged in a series of pig-feeding experiments with the object of demonstrating that by the intelligent use of their "Mebo" Meal and "Bonolik," pig-raisers can successfully raise pigs even when they have no milk available.

In one test carried out by Messrs. T. Borthwick and Sons, using a ration containing wheat, barley, and maize meals, with 10 per cent. Mebo, and 1 per cent. Bonolik, porkers reached an average dressed weight of 72 lb. at eight and a-half weeks after weaning. In this test only 2.88 lb. of meals were required to make 1 lb. live weight gain.

During the several tests liveweight gains of individual pigs for short periods have been as high as 2½ lb. daily.

The experiments, so far as they have gone, indicate clearly that milk is not an absolute essential in pig-feeding, and Mebo Meal (which is a protein rich, meat and bone meal), if fed in small quantities with grain, provides that essential flesh-forming element of the ration. Bonolik, which is a health-giving mineral mixture, provides the mineral requirement of the pig which is not always present in the more common pig foods.

Supplies of Mebo and Bonolik can be obtained from Messrs. Thomas Borthwick and Sons (Australia), Parbury House, Eagle street, Brisbane.

THE PRODUCTION OF CLEAN MILK.

By O. St. J. KENT, B.Sc., A.A.C.I., Dairy Branch.*

THE very important place which milk occupies in the human diet should render its clean production a subject of widespread interest. This is particularly so when we realise the extent to which small children are dependent on milk and milk foods. Were this the only reason why milk should be produced under the most sanitary conditions, it would be sufficient excuse for better and cleaner production, but there is another reason, which is almost of equal importance. This is the importance of clean milk in relation to our butter and cheese making industries.

Milk, whether for human consumption or for the manufacture of butter and cheese, can be rendered safe by pasteurisation, but this process cannot convert a poor quality milk into one of high quality, and it is on the high quality of milk that the keeping quality of our butter and cheese so much depends.

The Importance of the Dairy Industry.

Before proceeding any further, however, let us review the production figures for 1931, in order that we may gain some idea of the importance of the milk or dairy industry to this State.

During 1931 the quantity of milk produced in Queensland weighed about 2,500,000,000 lb. (equivalent to 250,000,000 gallons or over 1,000,000 tons), with a monetary value of £6,000,000.

All of this milk was not consumed by the public as whole milk; only 3 or 4 per cent. was utilised in this way. The remainder was converted into butter, cheese, ice cream, condensed milk, and other dairy products. The greatest quantity of milk was used up in the manufacture of butter, which accounted for 85 per cent. of the total produced.

Cleanliness in the Dairy.

It does not matter very much how milk is used, so long as it is marketed economically. What does matter, though, is the manner in which the milk is produced.

A healthy cow, having a sound udder, and being properly fed, will give milk of high quality. Whether or not the milk will retain that quality until it is delivered to the consumer or the factory depends entirely on the way in which the milk is handled and on the care it receives.

It has been truly said that the welfare of the whole of the dairying industry is intimately bound up with the sanitary quality of the milk produced on our farms.

The production of milk of high quality need not involve undue expenditure of money, but it does require a certain knowledge and effort at the right time.

The clean dairyman is perhaps not sufficiently remunerated at present for his extra care and attention, but he is always assured of a market for his milk or cream and does not lose money from spoilage or rejection at factories.

The demand for higher quality milk is steadily increasing, and the dairy farmer who learns to produce clean, high-quality milk is bound to profit by it.

The subject of clean milk production is one that has engaged the attention of scientists the world over, and many experiments have been performed to find out the most important sources of contamination during the handling of milk.

Causes of Contamination.

Let us now see what contamination means and where we must look for the causes of it.

It is now well known to most people that bacteria (or microbes or germs as they are more popularly called) have been found to be responsible for the deterioration that takes place in milk. Milk is not only an ideal food for human beings, but it is unfortunately an excellent food for most microbes. Milk may therefore be the best of foods or it may be the most dangerous. If it is not rendered dangerous to human health it is certainly soon spoiled by bacteria, unless care is taken to retard the growth of these undesirable invaders. All bacteria are not disease producing, although there are a number of common serious diseases spread through the use of unclean milk. Many types of bacteria are beneficial to mankind and are employed in various industries for our benefit. Bacteria of any kind are not beneficial to the quality of milk, so that it should be the aim of the dairyman to keep the bacterial count of his milk as low as possible.

* In a radio lecture from 4QG.

As milk passes on its way from the udder to the container in which it is delivered, it comes in contact with all sorts of contaminating substances and utensils.

Commercially, it is impossible to produce milk that is entirely free from bacteria. Bits of feeding material, dust from the air, dirt from the cow's coat, dirty hands, clothing, and utensils all contribute some bacteria to the milk.

The Cow.

Of all these the contamination from utensils stands out from all other sources, but we will examine each source in its turn. Let us look first of all to the cow itself. The average healthy udder produces milk which contains very few bacteria, while in some cases fresh milk is almost sterile. Milk from udders which are inflamed because of bacterial infection may contain hundreds of thousands of bacteria. Dairymen should avoid using milk from any except healthy udders. If both hand and machine milkers adopted the simple practice of drawing the first two streams of milk (which contains practically no fat and thus is no loss to the farmer) from each teat into a separate bucket, signs of disease in the udder would be noted by the presence of thick milk, and such milk could be rejected.

The Milk.

Milk must be kept free from dirt and dust, and this necessitates attention to the condition of the milking sheds. Bacteria and dirt are not the same thing, but dirt usually harbours large numbers of bacteria, especially the kind of dirt that is found on a cow's coat. Dirt must be kept out of the milk. Keep the cow's flanks and udder, the milker's hands, and clothing clean, and the amount of dirt that gets into the bucket will be negligible.

The Utensils.

The utensils are the greatest source of contamination, and many dairymen fail to realise the importance of clean utensils in high-grade production. Wash all your utensils thoroughly, and you will find that many of your troubles will cease.

Poorly washed moist milk pails add very large numbers of bacteria. Scalded and thoroughly dried pails add very few if any at all.

Poorly cleaned milking machines and separators add millions of bacteria to every pint of milk that passes through them. Well cleaned and sterilised machines add only a small number. Directions for cleaning and sterilising milking machines and separators can be obtained from the Department of Agriculture and Stock.

Cooling and straining of milk is carried out extensively at the present time, but no amount of cooling or straining can restore a dirty milk or a milk with a high bacterial count to its original high-grade condition. Cooling is carried out to retard the growth of bacteria, which thrive best at temperatures of from 70 deg. Fahr. to 100 deg. Fahr.

Surface coolers are the most efficient means of cooling all the milk quickly. However, unless they are cleaned, scalded, and dried properly, they may harbour very large numbers of bacteria.

Strainers remove coarse dirt. Improperly rinsed and poorly dried strainers may add very large numbers of bacteria to the milk. Cloth strainers used more than once are difficult to sterilise, and are therefore undesirable. Cotton disc strainers remove sediment excellently, and are sometimes required, but it must be remembered that these discs do not remove the bacteria from the milk. Bacteria are so small (approximately one-twenty-thousandth inch in diameter) that they can easily pass through the pores of these discs. Metal strainers which are used should be as simple as possible in construction, so that they are easy to clean and sterilise.

Milk and cream cans are frequently the source of large numbers of bacteria. The cans should be washed and sterilised at the factories. No matter how well the washing and sterilising is done, by the time the cans are used, some twenty-four or forty-eight hours later, the bacteria may have increased in them to such an extent as to make the cans unfit for use. It is advisable for the dairyman to sterilise the cans regardless of what is done to them at the factories.

When washing the cans, whether by steam or by scalding with boiling water, it is important that they should be allowed to dry before closing them. This is best done by inverting on a rack in a dry place which is free from dust. The dairyman who puts milk or cream into foul-smelling cans is just as responsible for the bad condition produced as is the factory man or milk dealer who fails to dry the can after steaming it.

Control of Bacteria.

The first step in effective control of bacteria in the utensils, as we have seen, is cleanliness. There is no difficulty in the matter of washing the utensils clean. Anyone can tell whether the surface of the utensil has a film of grease or whether the seams and crevices have traces of old milk dried on them. The only thing necessary for proper washing is plenty of hot water with enough washing powder in it, thorough scrubbing, and thorough rinsing. There is one good rule to follow—wash the utensils as soon as possible after they are emptied. If they are permitted to stand for several hours before they are washed the dirt and milk dries on them.

It is easy to tell whether a utensil is clean or not, but it is very difficult to tell whether it has been properly sterilised. For this reason sterilisation of utensils is not, as a rule, done effectively.

Plenty of steam or boiling water is necessary. A thorough rinsing of each can with half a gallon of boiling water is very effective. Three gallons of boiling water can very effectively sterilise four cans and two buckets.

If chemical sterilisers are used they must only be used after the utensils have been cleaned in the ordinary way. Chemical sterilisers are not effective unless the dirt and grease have been removed to a large extent. Avoid using sterilisers with undesirable odours and those which are highly poisonous. The method of using these sterilisers is simple. The amount recommended by the manufacturers is placed into the washing water and the utensils are rinsed in the usual way.

Essentials for Clean Milk Production.

In conclusion, then, we may summarise the essentials for clean milk production as follows:—

1. A healthy cow, clean and free from dirt.
2. The utensils that come in contact with milk must be properly sterilised.
3. Milk must be promptly cooled.

NORMAL TEMPERATURE OF ANIMALS.

	Degrees. Fahr.		Degrees. Fahr.		Degrees. Fahr.
Horse	.. 99.5	to	100.0		
Ox	.. 100.0	to	101.5		
Sheep	.. 101.0	to	103.0		
Goat	.. 101.0	to	103.0		
Pig (adult) ..	.. 101.0	to	102.6		
Pig (young) ..	.. 102.6	to	104.0		
Dog	.. 99.2	to	102.0		
Rabbit	.. 100.85	to	102.0		
Cat	.. 100.4				
Fowl (average)	.. 103.0	to	106.0	or	107.0
Small Birds ..	.. 104.6	to	108.0		

The small temperature of an animal as taken with a clinical thermometer is an index of the heat of the blood, and this, even in healthy animals, varies within certain limits. The normal temperature is raised slightly after a meal, during rumination, lactation, or pregnancy. Work also raises it, and exercise much as when pigs are driven at a rate faster than that at which they are accustomed to move. The temperature of the same animal is always higher in the evening than in the morning. Young animals have a slightly higher normal temperature than old ones, and animals of anxious and restless temperament a higher one than sluggish or sleepy animals.

The temperature of the pig is taken by means of a clinical thermometer inserted into the back passage (the anus) and held there for not less than sixty seconds, and for preference, a longer period. Care should be taken to "set" the thermometer before use, that is, to see that the mercury is a good deal below the line of normal temperature of the animal's body. Care in handling is emphasised.

Normal respirations of the pig are about fifteen respirations per minute. Normal pulse is about seventy-five beats per minute. The pulse can be taken on the inside of the fore leg.

PRODUCTION RECORDING.

List of cows, officially tested by officers of the Department of Agriculture and Stock, which have qualified for entry into the Advanced Register of the Herd Book of the Australian Illawarra Shorthorn Society, the Jersey Cattle Society, and the Friesian Cattle Society, production charts for which were compiled during the period 20th November, 1931, to 18th January, 1932. (273 days period unless otherwise stated.)

Name of Cow.	Age.	Milk Production.	Butter Fat.	Owner.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORN.				
Blue Bell 4th of Westbrook ..	Mature ..	10,598·5	449·508	W. F. Kajewski, Glencoe
Pearl 6th of Oakvale ..	Mature ..	9,209·5	380·362	W. F. Kajewski, Glencoe
Miss Ettie of Blacklands	Mature ..	10,090·449	402·490	A. Pickels, Wondai
Emma 4th of Wanghope	Snr. (3 yrs.)	6,728·65	312·545	A. M. Bowman, Kin Kin
Angeline 2nd of Bri Bri	Snr. (3 yrs.)	6,129·7	308·84	W. Middleton, Cambooya
Susy IV. of the Cedars	Jnr. (3 yrs).	6,732·09	281·963	W. J. Barnes, Cedar Grove
Starlight 9th of Upton	Jnr. (3 yrs.)	7,570·9	315·769	T. McLennan, Highworth
Star of Kingsdale	Jnr. (3 yrs.)	7,701·55	333·049	W. B. Warren, Yandina
Empress 24th of Burradale ..	Snr. (2 yrs.)	8,416·625	332·558	W. F. Kawjeski, Glencoe
Marion 8th of Euroa	Snr. (2 yrs.)	7,326·0	282·04	H. F. Lindenmayer, Binjour
Prettymaid of Kingsdale ..	Jnr. (2 yrs.)	6,507·0	285·61	W. B. Warren, Yandina
Fuschia 12th of Rosenthal ..	Jnr. (2 yrs.)	6,995·25	269·027	S. Mitchell, Rosenthal
Vision 7th of Meadow Hill ..	Jnr. (2 yrs.)	7,767·44	308·135	C. O'Sullivan, Greenmount
Blanch II. of Rockleigh	Jnr. (2 yrs.)	7,972·0	317·32	T. Strain, Wondai
Poppy 2nd of Blacklands.. ..	Jnr. (2 yrs.)	9,144·67	285·37	A. Pickels, Wondai
JERSEY.				
Magnets Girl 5th of Cozie Neuk ..	Mature ..	5,830·0	352·254	J. Bellert, Mundubbera
Glengariffe Nobles Velvet ..	Mature ..	5,862·95	355·593	Cox Bros., Maleny
Glengariffe Nobles Rozel	Mature ..	5,451·0	367·237	Cox Bros., Maleny
Trecarne Butter Queen	Snr. (4 yrs.)	9,042·756	651·164	T. A. Petherick, Lockyer
Oxford Mabs Joy	Jnr. (3 yrs.)	6,071·625	281·516	J. E. Smith, Mudgeeraba
Oceanview Foxies Belle	Jnr. (3 yrs.)	6,759·0	353·137	H. W. Thomason, Mount Mee
Burrawong Hopeful	Jur. (2 yrs.)	6,361·2	336·698	R. J. Bott, Yandina
Glengariffe Nobles Leda	Jnr. (2 yrs.)	4,166·25	231·105	Cox Bros., Maleny
Glengariffe Nobles Frailty ..	Jnr. (2 yrs.)	3,828·2	253·33	Cox Bros., Maleny
Fay 2nd of Woodstock	Jnr. (2 yrs.)	4,786·83	243·748	W. J. Sharp, Tara
Oxford Triumph	Jnr. (2 yrs.)	4,456·875	233·457	J. E. Smith, Mudgeeraba
Desert Maid of Brooklands ..	Jnr. (2 yrs.)	9,122·581	479·963	J. Williams, Wondai
FRIESIAN.				
Pet Rock of Oaklands	Jnr. (2 yrs.)	7,897·003	296·53	W. Richters, Tingoora

WHEAT AS STOCK FEED.

Many arguments can be advanced in favour of stock in the wheat-growing programme, and not the least is that they tend to greater security in returns. A seasonable article in this relation appears in the December "Agricultural Gazette of New South Wales."

Wheat is such a valuable food for human beings that unless it is of inferior quality it is rarely fed in quantity to stock. When, however, the price drops to a low level it immediately comes within the range of feeds available to the stock-owner. With a low price operating for wheat the producer can, if he has the facilities, feed the grain to stock, and in this way obtain a higher return for his wheat than if he sold it in the ordinary way, always providing that the price of beef, mutton, pork or bacon, &c., remains satisfactory. While the price of wheat remains at the present low level, rather than sell all their wheat many farmers will seek more profitable ways of disposing of it.

There are difficulties in the way of a quick change over to stock feeding, but if wheat growers, particularly those in the more favoured rainfall districts, were to pay more attention to the raising and fattening of stock, such as fat lambs, steers, or pigs, they would be in a better position to increase their stock-fattening activities quickly whenever the price of wheat dropped to a sufficiently low level to permit of its use for this purpose. During periods of normal wheat prices little if any wheat would be fed to the stock, which would be catered for by the growing of suitable fodder crops, particularly lucerne, which has proved so successful in most of the wheat districts. Field peas also offer great possibilities to those wheat districts with a good rainfall, and fit into the rotation with wheat in a most satisfactory manner.

RED POLL CATTLE.

The closing months of 1931 have been responsible in several ways for placing Red Poll cattle on an even more enduring basis. This was the definite conclusion of the Council of the Red Poll Cattle Society at the final meeting of the year held at Ipswich (England) under Lord Cranworth's chairmanship.

In open competition with other breeds, Red Polls have compared most favourably with both dairy and beef cattle, as competitions of a national character bear strong witness. At the London Dairy Show, Red Polls with excellent average daily milk yields also produced a high ratio of butter fat.

For quality in milk they have survived a greater test. The Co-operative Wholesale Society's cup competition for the best milk of the year in the eastern counties of England, from which area it collects hundreds of thousands of gallons of milk a year, went to the owner of a herd of Red Poll cattle. Over a period of several years this organisation has not rejected a single churn of Red Poll milk on the score of low quality.

On the beef side of the breed, the 1931 Christmas stock shows and sales have in a striking manner vindicated the "duel-purposeness" of Red Poll cattle. Steers of the breed exhibited and sold on these occasions have generally been the product of good milking dams of 800 gallons and upwards, and have without exception, encountered a keen demand from butchers, who have invariably given high prices for the Red Polls.

At the Smithfield Show auctions, Red Poll cattle realised 64s. 4d. per cwt., which compared with a general average of 61s. per cwt.; furthermore, it was in excess of the average price for other breeds and crosses except the first cross. This outstanding success for the Red Poll breed was by no means an isolated one. At the Norwich Christmas Show, Red Polls sold for an average of over 63s. per cwt. against a general average of 60s. 1d. for all cattle.

At the ordinary stock sales like results have been chronicled. Although the pure beef breeds have sold well, Red Polls have invariably topped the markets at prices running into several shillings a head more than the leading figures for other pure and cross-bred cattle. In Essex, at Colchester and Braintree, Red Polls led by such quotations as 71s. and 69s. per cwt. At Ipswich the same good trade was experienced for Red Polls with prices mostly from 63s. to 68s. 6d. per cwt.

This clear verdict in favour of Red Polls by the purveying trade is entirely due to the low percentage of waste in these cattle and because of the finely marbled character of the beef and its uniformly good quality.

These encouraging aspects of the present position of the breed taken in conjunction with the much improved trade for Red Poll bulls for cross breeding, together with the growing interest in the Dominions and South America, led the Council of the Red Poll Society to adopt the view that there is a greater future in store for the breed.

TREES ON THE DAIRY FARM.

Trees have a very definite value on the dairy farm, and the fact should be made a note of now that planting time is approaching.

Discussing this subject in a New South Wales departmental publication, a dairy instructor, located on the Murrumbidgee Irrigation Area, observes:—

"The scarcity of timber on this area is unfortunate for the dairy farmer, because of the lack of shelter for stock, of timber for fencing and outbuildings, and of firewood for dairy purposes. It seems certain that the systematic planting of belts of shelter-trees will have to be adopted to protect animals from the sun and flies in summer and from wind and rain during winter. An acre of good shelter-trees on these plains will conserve more animal heat and energy for the dairy herd than could be produced from an acre of good lucerne land.

"Firewood is scarce, and many farmers are averse from using sufficient to boil ample supplies of water for thoroughly washing utensils. A big proportion of second-grade cream can be traced to the use of cold or insufficiently-heated water in the washing of utensils. With the shortage of timber becoming acute, belts of timber will in a few years become a value asset. In addition, valuable fencing timber would soon be obtained from the judicious thinning of them, and there is a constant demand for fencing timber for renewals, subdivisions, &c."

REDUCING THE CORROSION OF METALS CAUSED BY BRINE.

All brines used in refrigeration cause corrosion of metals, and the competent operator must arrange to retard this corroding action as far as possible, otherwise the piping and equipment carrying the brine will become unserviceable long before it should, and unnecessary expense for replacements will be incurred.

This corrosion is caused by the action of an electric current which is immediately set up when two different metals are immersed in brine. The action is hastened or retarded according to the kind of brine solution used, the metals used, and the relation of the equipment to any electric generators near it.

It is generally agreed that the best brine to use to prolong the life of the equipment is made of calcium chloride, which is free from magnesium chloride, and the brine should be made up from water free from any acid. The equipment should be made up as nearly as possible from one metal to prevent the formation of electric currents, although certain alloys, such as bronze, which is used as impellers in brine pumps, resist corrosion very well.

An alkaline brine is not as corrosive as an acid brine, and, as an acid brine can be detected and corrected very easily, a little effort in keeping the brine alkaline should be employed. This is quite easily done. One method is to take a small sample of the brine which is to be tested and pour a little or it into a methyl orange solution. If the mixture turns yellow the brine is alkaline. If, however, the mixture turns red the brine is acid, and should be made slightly alkaline. This can be done very easily by hanging a bag of lime in the brine tank where the returning brine will wash over it. Keep up this treatment until the test shows the loss of the acidity, and then test the brine from time to time to be sure that the acidity does not return.

The methyl orange solution is made by dissolving one-tenth of a gram in 100 cubic centimetres of distilled water.

Another method for correcting the brine is one outlined by Russell, Roberts, and Chappell in the report of the Corrosion Committee of the American Society of Refrigerating Engineers, and consists of using sodium dichromate and enough sodium hydrate to convert the dichromate to chromate. For a system using 1,000 cubic feet of calcium chloride brine, it is recommended that 100 lb. of dichromate be used together with 35 lb. of 76 per cent. caustic. After adding the salt and the caustic, the brine should be slightly alkaline.

It is to be remembered that brine solutions containing magnesium chloride cannot be made alkaline, and are to be avoided because of the increased rate of corrosion which they cause.

Corrosion is also increased by the presence of air in the brine, and a common cause of this is the brine return line not being submerged below the level of the brine in the brine tank. Another cause is the presence of air pockets in the brine lines; and this can be guarded against by providing air cocks so that the air can be purged out of the lines.

As for stray electric currents from electric apparatus being set up in the brine and causing corrosion, this can be guarded against by seeing to it that all electrical apparatus is properly insulated, especially any direct current apparatus which may be around the plant. Electric currents are very easily set up in a brine system. For instance, the stress set up in a pipe end when it is threaded causes an electrical difference of potential between the threaded end of the pipe and the rest of the pipe, and the strained part of the pipe where the threads are is attacked and eventually destroyed by corrosion. Hence, retard the corrosion to make the pipe last. This costs less than making the pipe of extra heavy thickness.

Impurities in the metal in a pipe act in the same way as two different metals in the system, and this causes the severe corrosion sometimes found in cast-iron brine equipment.

If a leak should develop in an ammonia coil in the brine tank, of course some ammonia will go into solution with brine. Of course, the leak should be repaired; but the ammonia will tend to retard corrosion by the brine unless magnesium chloride is present, which will cause the formation of ammonium chloride, which will hasten corrosion. Small amounts of ammonia in brine can be neutralised by injecting carbon dioxide gas in the brine. Very little carbon dioxide is required. The ice manufacturer uses 50 to 75 lb. for a 100-ton plant. This gas can be purchased in small drums from soda fountain supply houses.

Of course, these remarks pertain to the inside surfaces of a brine system. Rust on the exterior surfaces is to be prevented in the usual manner with protective coatings.—"The Ice Cream Review."

CLIMATOLOGICAL TABLE—JANUARY, 1932.

Compiled from Telegraphic Reports.

Districts and Stations.	Atmospheric Pressure. Mean at 9 a.m.	Shade Temperature. Means. Max.	Means. Min.	Extremes. Max.	Date.	Min.	Date.	Rainfall. Total.	Wet Days.
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	29·78	87	76	94	22	71	20	2,934	11
Herberton	..	81	63	95	13	50	10	1,139	13
Rockhampton	29·86	89	71	107	13	67	15	188	5
Brisbane	29·94	87	69	99	10	64	20	306	3
Darling Downs.									
Dalby	29·89	95	66	109	10, 12	55	16, 17	96	4
Stanthorpe	..	89	60	102	10	50	21	59	4
Toowoomba	..	87	63	103	10	55	16	48	4
Mid-Interior.									
Georgetown	29·76	94	73	106	11	66	5	431	8
Longreach	29·79	102	74	116	10	66	16	22	2
Mitchell	29·85	97	68	111	10	53	1	135	4
Western.									
Burketown	29·75	95	78	101	14	71	24	585	7
Boulia	29·73	106	80	115	9, 10, 12	71	16	0	0
Thargomindah	29·78	103	76	113	29, 30	63	6	0	0

RAINFALL IN THE AGRICULTURAL DISTRICTS.

Table showing the Average Rainfall for the Month of January, in the Agricultural Districts, together with Total Rainfall during January, 1932, and 1931, for Comparison.

Divisions and Stations.	Average Rainfall. Jan.	No. of Years' Records.	Total Rainfall. Jan., 1932.	Jan., 1931.
North Coast. ..	In.		In.	In.
Atherton	12·00	31	15·74	10·42
Cairns	16·60	50	37·13	17·42
Cardwell	16·75	60	23·99	11·72
Cooktown	14·45	56	29·34	11·45
Herberton	9·68	45	11·39	4·06
Ingham	16·06	40	14·14	11·54
Innisfail	20·33	51	38·76	20·63
Mossman Mill ..	17·32	19	28·12	29·77
Townsville	11·23	61	8·86	1·43
Central Coast.				
Ayr	11·34	45	12·31	3·95
Bowen	10·23	61	9·96	2·09
Charters Towers ..	5·57	50	4·64	1·43
Mackay	14·32	61	29·49	3·82
Proserpine	16·36	29	25·02	10·00
St. Lawrence ..	9·63	61	5·79	2·28
South Coast.				
Biggenden ..	5·41	33	1·23	2·03
Bundaberg	9·07	49	0·52	2·79
Brisbane	6·45	81	3·06	4·54
Caboolture	7·92	45	1·49	11·05
Childers	7·86	37	0·39	2·99
Crohamhurst ..	13·05	39	0·90	14·76
Esk	5·85	45	0·46	4·06
Gayndah	4·74	61	0·45	1·40
Gympie	6·82	62	0·26	5·56
South Coast—continued:				
Kilkivan	5·71	53	0·05	4·21
Maryborough ..	7·50	60	0·62	1·34
Nambour ..	10·25	36	0·90	11·58
Nanango	4·76	50	1·19	6·01
Rockhampton ..	8·63	45	1·88	3·24
Woodford	8·13	45	0·84	8·97
Darling Downs.				
Dalby	3·29	62	0·96	1·43
Emu Vale	3·20	36	0·98	1·15
Jimbour	3·58	44	0·88	2·19
Miles	3·70	47	0·62	1·27
Stanthorpe ..	3·56	59	0·59	1·65
Toowoomba ..	5·08	60	0·48	6·23
Warwick	2·53	67	1·23	1·98
Maranoa.				
Roma	3·20	58	0·44	1·24
State Farms, &c.				
Bungeworgorai ..	1·94	18	..	1·04
Gatton College ..	4·18	33	2·29	3·51
Gindie	3·85	33	1·33	4·39
Hermitage	3·18	26	..	1·68
Kairi	9·65	18	17·68	10·21
Mackay Sugar Experiment Station	14·47	35	25·51	4·12

GEORGE G. BOND, Divisional Meteorologist.

General Notes.

Staff Changes and Appointments.

Messrs. W. E. Chandler, senr., and W. E. Chandler, junr., of Mowbullan House, Bunya Mountains, via Dalby, have been appointed Honorary Rangers, under and for the purposes of "*The Animals and Birds Acts, 1921 to 1924*," and "*The Native Plants Protection Act of 1930.*"

Woongarra Sanctuary.

The Governor in Council has to-day approved of the issue of an Order in Council under the Animals and Birds Acts, declaring all roads and reserves within the Shire of Woongarra to be sanctuaries for the purposes of the abovementioned Acts. It will now be unlawful for any person to take or kill any animal or bird on the roads and reserves in such Shire.

Dairying Development.

The Minister for Agriculture and Stock (Mr. H. F. Walker), in referring recently to the dairy industry as a vital factor in the progress and prosperity of this State, pointed out that the development of the industry along efficient lines was a heartening feature in these times of stress, and expressed the hope that the further settlement of our Crown lands with a resourceful energetic manhood would bring to this State a full measure of the prosperity that is assured by the development and utilisation on modern lines of the fertile soils which exist throughout our far-flung spaces.

The expectations of a rapid and substantial increase in the output of dairy products, consequent on the favourable climatic conditions which heralded in the spring season, have been fulfilled.

All our butter and cheese factories experienced a rapid increase in supplies, and the intake of dairy produce has taxed the capacity of our largest manufacturing plants to their limit. There is every reason to believe that the present season's output will eclipse that of 1931, which was a peak season.

The favourable season is reflected in the activities prevailing on the grading floors. The grading officers at the Hamilton Cold Stores graded 17,860 boxes of butter on the 4th January, constituting a record for one day's grading, while at Birt's Cold Stores the graders are working at high pressure in order to cope with their work.

The prolific growth of fodder crops has stimulated the interest in the conservation of fodder in the form of silage, and officers of the Department are advising and instructing all interested in this important section of dairy farming.

Silage as a method of conserving fodder has much to commend it, as many kinds of forage plants and grasses can be conserved when in a green state, and when so treated form a suitable food for dairy cattle.

Silage provides a succulent roughage to meet the requirements of the dairy cow during a period in which there is a shortage of green pasturage and fodder crops.

From our native pasturage is produced the greater portion of our dairy products. Dairy farmers and stock-raisers have now a greater appreciation of the value of our native grasses and fodder plants.

Top-dressing experiments of pastures are being carried out in a number of districts. Such treatment, combined with rotational grazing, will further demonstrate the all-important part that our native pasturage plays in the progress of the dairying industry of the State.

Herd-testing operations are being extended, and dairymen whose enthusiasm has been sustained over a period of years are now reaping the reward of their foresight by increasing the average production of their herds.

The opening of 1932 finds the dairy season most promising, and the progressive movement in various branches of the industry augurs well for its future development throughout the State, and to its assuming the position of the foremost contributor to the value of our primary products.

Egg Board Election.

Nominations will be received until 5 p.m. on the 21st March next, for the annual election of growers' representatives on the Egg Board. Five such representatives are to be elected, and each nomination is to be signed by at least ten growers of eggs who own fifty or more fowls. Any person who is at all doubtful whether his name is on the voter's roll should make enquiry from the above Office.

Sorghum for Winter Feed.

Sorghum thrives best in districts having a good rainfall and a long summer season. The young plants, when well established, will withstand dry weather well and rapidly respond to any rain that falls. Maize, on the other hand, if it receives a somewhat severe check through lack of moisture, seldom recovers, and matures in a stunted condition. If light frosts are experienced in the autumn the growth of sorghum is checked, and heavy frosts injure the crop, although the leaves and stems do not lose their succulence for some time afterwards; but sorghum stands longer into the winter than maize, and this fact ensures the crop a place on all farms requiring early winter green feed.

Ophthalmia in Sheep—Two Useful Lotions.

In the treatment of ophthalmia (commonly called "pink-eye") in sheep, an infectious inflammatory condition of the eye which is prevalent just now, it is important that the trouble be taken in hand before it has gone too far. Both the following lotions have the recommendation of the Stock Branch of the Department of Agriculture:—

(1) { Sulphate of Zinc .. .. 1 part.
{ Boiled water .. .. 40 parts.

Equal to one dessertspoonful of Sulphate of Zinc in half a pint of water.

(2) { Iodine .. .. 3 grains.
{ Potassium Iodide .. .. .. 6 grains.
{ Boiled water .. .. 2 ounces.

Two or three applications of either of these lotions at intervals of a few days are usually sufficient to check the disease in the early stages. Before administering the lotion, the eyes should be freed from overgrown wool, grass seeds, &c. The sheep should then be held with the head on one side, the eye directed upwards, and several drops of the lotion instilled into the eye by means of an eye-dropper or piece of clean cloth saturated in the lotion, or with a feather which has been cleaned in boiling water. In doing this, the eyelids should be drawn away from the eyeball, and care taken to see that the lotion flows under the lids and reaches all parts of the eye.—A. and P. Notes. N.S.W. Dept. Agric. and Stock.

Shade for Sheep—Another Argument for Trees.

The economic importance of trees on the farm and the attractiveness they add to the homestead have frequently been emphasised in these notes, but one aspect of their utility may well be stressed just now—that represented by the shade they afford to stock. At this time of the year, when sheep are being grazed largely on stubble paddocks (observes the Sheep and Wool Expert of the New South Wales Department of Agriculture), the lack of such provision is very noticeable. Sheep cannot be expected to do well if deprived of ample shade during the summer months. Anybody who has handled sheep in hot weather and noticed how they proceed from one patch of shade to another will appreciate the importance of this point.

Many farmers ridicule the idea that sheep need shade, and in normal seasons it would be hard to point to any direct loss through lack of it. The following experience, however, very clearly demonstrates its value. During 1922, when, as at present, grass seed was very bad, the forequarters of the sheep at Trangie Experiment Farm became heavily charged, the seed piercing the skin and causing considerable pain. Very hot weather was experienced in the early summer, and the sheep congregated in the shade under the trees by 10 o'clock in the morning, and in many cases to relieve their suffering would lie on their sides and extend their legs to the fullest extent. It was found that as the day advanced and the shade moved off the sheep the animals quite often would not make the effort to draw their legs under them in order to move, and that unless assisted to their feet died from heat stroke within a few hours. Despite unceasing attention, heavy losses occurred, due entirely to this cause.

Winter is the season for actual tree planting, but it is always seasonable to plan for such improvement of the farm.

Feed for Fat Lambs.

To market a perfect lamb, good feed and plenty of it is essential at all times during the growth of the lamb. This involves supplementing the pasture with such crops (according to the district) as oats, skinless barley, rape, turnips and lucerne. In every case autumn is the time for sowing, and during autumn too should sowings of grasses and clover for pasture improvement be made.

The crop should be ready for the ewes to go into just prior to lambing. It should fit in with the general farming system, and where wheat is grown serve as a rotation for that crop. For that reason oats is perhaps the most suitable, as besides providing a large bulk of feed it is succulent and acts as a check to some of the wheat diseases. There are a number of varieties to choose from suited to different conditions and seasons. Skinless barley is also recommended, and provides particularly good feed.

In cool districts rape, or a mixture of rape and barley, will give a great bulk of feed if the season is suitable for a good germination of the rape. Rape alone should be fed off with care, or losses may occur from "hoven." A crop of turnips (purple top swedes) will provide a wonderful amount of feed in the winter. This crop will grow readily in cool districts if sufficient care is taken in the preparation of the ground and drilling in of the seed. It can be fed in the paddock, as after eating the tops the sheep will eat the "turnip" in the ground. This crop is used extensively in New Zealand in this way.

Wherever possible all fat lamb raisers should have one or more paddocks of lucerne. Even in the outer fringe of the fat lamb raising areas paddocks sown with lucerne for grazing have given wonderful results. Where grass seed is liable to give trouble a paddock of lucerne will assist in getting the lambs away before the dangerous period arrives.

Trusting to natural pasture is a risky business—very rarely will prime lambs be produced off such feed—but a large proportion of our pastures can be improved by top-dressing and in some cases by the sowing of better grasses and clovers, so that the feeding value is enormously improved. By the growing of fodder crops, sowing of lucerne, improvement of our pastures by top-dressing, and the sowing of better grasses and clovers, we will be getting nearer to the ideal feed standard required for successful production of high quality carcases.

The importance of consistently good feeding during the growth of the lamb cannot be too strongly stressed. An uneven system of feeding and forcing lambs will result in lumpiness through excessive fat in certain parts. The perfect export lamb is not grossly fat, but has a maximum of meat properly spread with a reasonable covering of fat, and this can only be produced by regular and high quality feeding of both the ewe and lamb.—A. and P. Notes, N.S.W. Dept. Agric.

Obituary—Major H. O. Newport.

News has been received from New Guinea of the death, on the 16th December last at Rabaul, of Major Howard Oliver Newport, for several years in the service of the Queensland Government.

Major Newport joined the Department of Agriculture as Instructor in Coffee Culture in 1898, and for eleven years prior to that time he had been engaged in tropical agriculture in India. He afterwards took over the managership of the State Nursery at Kamerunga, near Cairns, and in 1905 was appointed Instructor in Tropical Agriculture, a position he filled until March, 1915, when his services were loaned to the Federal Government, following upon the occupation of German New Guinea by the Commonwealth. This resulted in his being given the Directorship of the Botanic Gardens at Rabaul, and ultimately the Directorship of Agriculture of the Territory of New Guinea. A few years ago, Major Newport resigned his Federal position to take over a copra plantation on his own account.

Mr. Newport was educated at the Nonconformist Grammar School, Bishop's Stortford, Hertfordshire, England. At the time of his death, he was about sixty-three years of age. His widow, a Queensland lady (nee Laurie), is still in Rabaul.

While in the service of the Queensland Department of Agriculture, Major Newport was a prolific and informative writer, and many of his handbooks on various tropical crops are still regarded as standard text-books on their respective subjects.

Answers to Correspondents.

BOTANY.

The following answers have been selected from the outgoing mail of the Government Botanist, Mr. C. T. White, F.L.S., and the Assistant Botanist, Mr. W. D. Francis:—

A Doubtful Native Fruit (*Rhodomyrtus cymiflora*).

S.A.B. (Mackay)—

The specimen is from *Rhodomyrtus cymiflora*. This is a native species confined to tropical Queensland. It is quite likely that the fruit is edible, but as the species is closely allied to the Finger Cherry (*Rhodomyrtus macrocarpa*) there is a possibility that it may have somewhat similar properties as that plant and be capable of destroying the human eyesight, and should therefore be avoided or handled with the greatest care.

Button Grass.

J.D. (Thangool)—

The sample represents the Button Grass, *Dactyloctenium radulans*. This is a fairly short-lived grass, but provides good fodder while it lasts, and stock are very fond of it.

Milky Cotton Bush.

R.W.B. (Jondaryan)—

The specimen is *Gomphocarpus fruticosus*, the Milky Cotton Bush. It is probably injurious to stock if eaten in any quantity, but cattle and sheep generally avoid it. It is not allied in any way with the cotton plant.

Barnyard Millet.

A.H. (Moore)—

The specimen is the Barnyard Millet, *Echinochloa colona*. This is an excellent fodder grass before it flowers. It is fond of damp places, but is reputed not to stand very close feeding. No information is available as to whether or not it makes good hay, but it is possible that it may contain rather too much moisture for this purpose. However, it could be tried on a small scale to test its haymaking qualities.

Native Rhodes Grass.

J.D. (Thangool)—

The specimen is *Chloris virgata*, an ally of Rhodes Grass (*Chloris Gayana*), and sometimes known as Native Rhodes Grass. It is a very aggressive plant and will encroach on cultivated land. It is much less palatable than Rhodes Grass, and from a fodder point of view is an inferior species.

Giant Couch Grass.

A.B. (Didcot)—

So far as can be determined from your specimen, which bore no seed-heads, the grass is *Brachiaria mutica*, more commonly known in Queensland as Panicum muticum, Giant Couch or Para Grass. In coastal localities, especially in the tropics, this species is held in high esteem as a fodder, being preferred by some farmers to such well-known grasses as Paspalum and Rhodes. In Fiji it is regarded as a nuisance in sugar-cane cultivations. It does not appear to be very drought-resistant. It is doubtful whether it would thrive in places with a low rainfall, although it is recorded that it has done well at Biggenden. It does not grow readily from seed, but is mostly propagated from cuttings.

Botanical Specimens for Identification.

D.B.D. (Charters Towers)—

Flowering or fruiting material is often necessary for the identification of plants. In the case of trees or shrubs, a twig about nine or ten inches long bearing leaves and, if possible, either flowers or fruits should be forwarded. Grasses should be pulled up by the roots, and seed-heads should be included. Specimens of weeds should comprise whole plants, as far as possible, bearing either flowers or fruit. All specimens should be pressed flat between sheets of newspaper for a few days before sending.

Tick Trefoils.

F.B. (Bracewell)—

The specimen has been determined as *Desmodium biarticulatum*, one of the Tick Trefoils. As a general rule the Tick Trefoils are regarded as fairly good fodders. As they are leguminous plants they contribute to the nitrogen content of the soil.

Shade Trees for the Milking Yard.

H.I.R. (Cooroy)—

The Weeping Fig would be suitable for planting round a dairy yard. Young trees may be obtained from Mr. Charles Petersen, Nurseryman, Kuraby, and may be planted at any time. In sunny, hot weather the young trees should be shaded for two or three weeks after planting. The Moreton Bay Fig, and almost any of the native figs which grow in the scrubs in your district, would also be suitable for shade trees. The Moreton Bay Fig has a very wide spread, and is on this account very suitable for shade on dairy farms. It would most likely also be obtainable from Petersen's Nursery. In some cases the Moreton Bay Fig and other native figs are planted in upright hollow logs fixed in the ground. When planted in this way the roots of the tree pass down the hollow in the log and eventually burst it, and the column thus formed really acts as a stem. At the same time the hollow log keeps the young tree out of the reach of cattle.

Sandalwood.

J.D.R. (Yeulba)—

The specimen is from the Queensland Sandalwood, *Santalum lanceolatum*. It is this species which is exported from North Queensland to China. Wood from localities south of Charters Towers has not the same fragrance as that from trees growing further north. There is no other apparent difference between the northern and southern trees.

Bloodroot.

A.J.K. (Magnetic Island, N.Q.)—

The specimen is Bloodroot (*Hæmodorum coccineum*). This plant is reputedly poisonous to stock, particularly horses, in North Queensland. In mild cases griping occurs, but the animals are said to recover when put back on to normal food. The poisonous principle has not been isolated.

Horse or Sword Bean.

C.D.B. (Bundaberg)—

The pod is from the Horse Bean or Sword Bean, *Canavalia ensiformis*, a native of tropical America. Some people eat the beans in the very young state, but as there are poisonous varieties of the species care should be taken in using them for culinary purposes, or it would be safer not to use them at all. The edible one is a perennial plant of a scarcely twining habit with rather small, rose-coloured or white-red flowers afterwards turning light lilac or violet. The poisonous variety is a robust twiner with large pure white flowers which afterwards turn pink.

Plants Identified.

C.H.W. (Pittsworth)—The specimens are:—

1. *Canthium odoratum*, a native tree with a close white wood fairly common in the drier scrubs of Queensland. We have not heard a common name given to it.

2. *Lyonsia eucalyptifolia*, sometimes called Native Yam because the roots are tuberous. The leaves are said to make good feed for stock in times of drought.

Regarding your other inquiries, the name "implexa" is Latin, signifying entangled or interlaced, and refers to the twisted pods. The word "decurrens" is Latin, meaning running down, and refers to the leaf stalks running down the branches for a little distance in the form of a fine line.

The Young Farmer.

THE RICHNESS OF MILK.

By C. F. McGRATH, Supervisor of Dairying.

An Inherited Factor.

FAT content of milk is a characteristic inherited by the modern dairy cow, and her milk cannot be made richer in fat by any known method of feeding, providing she is normally well nourished.

Nature's inexorable law makes provision for the welfare of the calf. The milk of the cow is the ideal food for the calf. If the composition and food value of the cow's milk varied with every change of feed, such as occurs seasonally in pasturage and by variations in the feed available, Nature's laws for the preservation of the life of the species would be negatived and the calf's health would suffer. In fact, it would be difficult for it to exist.

Composition of Milk.

The composition of milk does not change with variations from a standard ration except in unimportant respects.

Mineral and fat deficiencies in foods are provided against for limited periods by the body reserves of the animal. The amount of such reserves is dependent upon the physical condition of the cow. A cow in normal thrifty condition can tide over a temporary period of shortage in the food supply.

If the food consumed by a cow provides a surplus of materials required for bodily maintenance and milk production, the surplus is devoted to body structure or is wasted.

During a rest period the dairy cow stores in her body surpluses of materials which provide against temporary periods of shortage in feed supply, especially when in lactation.

The relation between the food consumed by the dairy cow and the fat content of the milk she produces has been a subject of investigation in the chief leading dairy countries of the world. Reports of the research institutes which carried out exhaustive experiments state that the conclusions arrived at indicate definitely that the fat test of milk cannot be changed permanently by any known method of feeding.

The results of experiments have shown that sudden changes in the ration, such as the addition of large quantities of oil, may raise slightly the fat test of the milk of some cows over a limited period, such as two or three milkings, while in the case of milk produced by other cows under similar conditions no change occurred.

Fat Content a Natural Characteristic.

The conclusion arrived at is that the cows dairied under normal conditions will produce milk the fat test of which is a characteristic of the animal, and that no system of rationing or method of feeding has been devised by which a Holstein cow can be made to produce milk as rich in fat as a Jersey. The feeding of a balanced ration and correct dairy farming practice will increase definitely the milk yield to the limit of the cow's capacity, but the fat test will not be affected to any appreciable extent. The dairy farmer is repaid for his care and attention by the increase in the yield of milk and the butter fat, not by an increase in the fat test in the milk produced. For example, a good cow properly fed will produce 40 lb. milk at 4 per cent. test = 1.6 lb. of butter fat. A good cow badly fed will produce 18 lb. milk at 4 per cent. = .72 lb. of butter fat.

Climatic conditions may affect the yield and fat test of the milk. There is a tendency for the fat test to fall during a spell of excessive heat. Under normal dairying conditions, however, the cow produces a milk the richness of which is a characteristic inherited by her just as is the colour of her hair, and also other characteristics associated with animals of the several dairy breeds.

The intelligent work of studmasters has given to the dairy world animals prepotent in dairy characteristics, the richness of whose milk is inherited, and is not controlled by foods and methods of feeding, providing that the animal is normally well nourished and is not affected with organic or communicable disease.

USE AND CARE OF MILKING MACHINES.

Issued by the DAIRY BRANCH, Department of Agriculture and Stock.

It frequently comes to the notice of the Department that milking machines are discarded by dairy farmers allegedly owing to the production of lower-grade cream. It is generally found, however, that lack of suitable attention on the part of the dairy farmer is the primary cause. As the milking machine is one of the greatest factors in dairying economics, the following instructions in regard to their use and care are re-issued.

With proper care and attention to cleanliness machines will deliver first-class produce.

Milking.

Keep the milking shed, yards, and surroundings in a clean, sanitary condition. Wash the cows' teats in clean water, and draw milk from each teat and ascertain if the milk is normal before putting on the teat cups. To place the teat cups in position bend them all down except the one you are going to attach to the teat; attach each cup in like manner. When the cups are all attached and the milking is proceeding satisfactorily, do not interfere with the machines until the cow is milked out. See that no air enters the cups and destroys the vacuum; this defect is indicated by a hissing sound caused by the air rushing into the cups.

Should a cup fall off the teats give it immediate attention, as the suction will draw dust and particles of dirt into the system and contaminate the milk.

The cleansing of the milking machines is one of the most important parts of the dairyman's operations. Failure to thoroughly wash and properly cleanse the plant after each milking will result in the production of low-grade milk, cream, and dairy products.

Cleansing the Machines.

After completion of milking do not delay in carrying out this important work, which will, if properly performed, materially assist in producing high-grade milk.

Turn off the air tap in each bail. Start at the end bail and clean adhering particles of dirt from the outside of the cups and claws so as to prevent the dirt entering the flushing water. Then thoroughly flush each unit in turn by drawing through it at least half a bucket of cold water, dipping the cups in and out of the water so as to draw in air during the flushing. A thorough flushing out with cold water will remove traces of milk from the rubber teat cups, pipes, releaser, &c. Always use cold water for this flushing. On no account should hot water be used, as it will tend to cause casein to become caked on the inside of the pipes. Scalding water at a temperature of at least 180 deg. Fahr., to which may be added one tablespoonful of washing soda to every 2 gallons, should then be drawn through the cups and pipes, care being taken to admit the water slowly at first in order to gradually heat the sight glass so as to prevent its breakage. Thoroughly clean the milk pipe line by means of the brush supplied with the machine, and according to instructions. The air pipes and vacuum tank, which frequently become foul owing to milk vapours entering and condensing in them, should be regularly cleansed and sterilised with boiling water. With machines in which water can be drawn through the air pipes by means of the vacuum pump, care should be taken not to flood the vacuum pan, thereby causing the water to get into the pump. The sterilisation of dairy appliances and equipment is most effectively and economically done by boiling water, and where it can be utilised nothing is usually gained by the addition of chemical disinfectants. When the cleansing of the piping is completed, open all taps and leave the pump running for a few minutes to dry out the pipe line. This assists in keeping the plant in a sanitary condition. Leave all pipes open when the plant is not in use, so as to allow the air to circulate through the system. The releaser should be detached, thoroughly cleansed, and allowed to dry.

Cleansing the Teat Cups.

When the flushing out of the machine as described has been completed, remove the teat cups and rubber connections. Dissemble the cups, and carefully brush the cups and claws with a dairy scrubbing brush. This should be done in hot water in which soda or a cleansing powder has been dissolved. It is essential to remove all grease in the first flushing and to then brush and cleanse the rubbers. If the rubber inflations have not been thoroughly cleansed they will be sticky to the touch, which is an indication of a film of grease on the rubber. The surface of a well-cleansed rubber will cling when the finger is rubbed along it. Careless cleansing will allow the grease to penetrate the surface of the rubber to the extent that it cannot be scoured out, and the rubber will perish. Rubbers so affected should be

discarded. Careless cleansing of the inside of the teat cup cases gives rise to corrosion and pitting of the surface. Where cups have screw caps the cleansing of the threads should receive attention, and a slight smear of vaseline applied to threaded parts will assist in keeping them in good order. The dissembling and cleansing of cups and claws should be done as frequently as possible and not less than three times a week.

Cups and rubbers, after being cleansed, may be either left in an antiseptic solution or may be dipped in same for fifteen to twenty minutes, then removed and placed in a suitable receptacle in a cool place, away from the light, and protected from flies and dust. The vessel in which the disinfecting solution is held must be large enough to allow of the teat cups and rubbers being immersed in the solution without doubling the rubber tubes in a manner to prevent the complete displacement of air by the disinfecting solution.

Several solutions for dipping or soaking the cups and rubbers are recommended by manufacturers of the different milking plants, and include chlorine compounds, lime water and permanganate of potash, and brine solutions.

Special attention is drawn to the necessity of removing all traces of the solution that may be used for the sterilisation of the cups, rubbers, pipes, &c., that come in contact with milk, before the machine is again used. This is done by flushing each unit with sufficient hot water to effectively remove any trace of the solution before commencing to milk.

Many dairymen object to very hot water for cleansing rubber, believing that the rubber is destroyed. The judicious use of hot water will do no harm to rubber, provided that all grease is removed from the rubber before the hot water is applied. Rubber, if kept in water for ten to twenty minutes at a temperature of 165 to 175 deg., will be unharmed by the heat, and most bacteria which detrimentally affect milk will be destroyed. If the rubber is placed in water at a temperature of from 180 to 190 deg. Fahr. long enough only for the surface of the rubber to be heated to the same temperature, the same object will be attained without injury to the rubber.

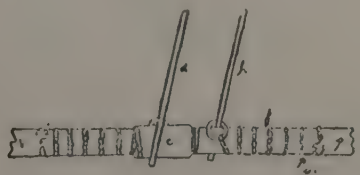
Lime a Suitable Disinfectant.

An efficient disinfecting solution is made by adding two pounds of quicklime to ten gallons of water. Stir well and allow the solution to settle. Pour off the clear liquid and immerse teat cups and rubbers in it for a period of fifteen to twenty minutes.

IMPROVISED PIPE WRENCH.

Here is a very useful tip that every farmer ought to know. It very often happens that farmers have to unscrew or screw up piping and often, too, have not the right tools on the spot. Even the monkey tail wrenches used for the purpose sometimes tear to bits on hard jobs, but this simple device is guaranteed non-slip and to work well once you have got the "trick."

Get two ordinary lengths of 8 feet 6 inches, ½-in. or ⅝-in. trek chains, and two iron bars (that will not bend) about 5 feet to 6 feet long, to be used as levers. Now wind the chain (*a*) round and round the pipe (*b*) and socket (*c*); then put bar (*d*) through ring at end of chain. At (*e*) tie hook with thin wire to one of links in chain. Now get a man to "lever" tight.



Next wind chain (*f*) round the pipe (*g*), put bar (*h*) through ring at end of chain. At (*i*) tie hook to one of the links. Now pull lever tight and proceed in the ordinary way.

The sketch given is for "screwing in" the pipe; for "unscrewing," arrange the chains the other way about. This is best suited for pipes from 1½ inches upwards to any diameter.—"New Zealand Farmer."

The Home and the Garden.

OUR BABIES.

Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of maintaining their health, increasing their happiness, and decreasing the number of avoidable cases of infant mortality.

CHARACTER TRAINING.

We borrow this article from the New Zealand Society for the Health of Women and Children. Though addressed to Girl Guides, it may be recommended also to mothers.

Food Mothering and Wise Management.

GIRL Guides know well that character and conduct are supremely important in life. In concluding these short talks on the care of babies and little children, we want to leave it very clear and definite in your minds that the foundations of good conduct—that is, self-control, consideration for others, and all the high qualities of character—are laid down in babyhood and childhood. This side of the care of little ones—one might call it the care of their minds and souls—is of quite equal importance to the care of their little bodies. Happily, the two things go together very largely. Body and mind are so closely bound up together that we cannot divide them into two compartments and treat them separately. This makes character training simpler, because by good mothering and wise management we can form the baby's habits so as to build a sturdy, self-reliant mind at the same time as a strong and healthy body.

Diet.

You all know what diet is to the body. Good diet supplies proper building materials out of which a strong frame and healthy organs are made. A poor diet is lacking in these essentials, and results in a poor, flabby body. Now someone has said that what diet is to the body habits are to the mind, which is a wise saying. Good habits of regularity, self-control, reasonable obedience, and so on in all the nursery happenings of every day, like sleeping and feeding and going to the toilet regularly and taking care of toys, &c., provide the "building materials" for a healthy, normal mind, whilst bad habits and "spoiling" in these simple matters leads to lack of self-control and a flabby, undisciplined mind.

Habits.

Habits are interesting things. They are made, not born. The new baby has no habits, but begins to form them from the very first. Habits are really mental, though they result in physical activity. A baby's mind is something like a smooth sheet of wax. Every action makes a groove on it, and every time that action is repeated in that particular way the groove is made deeper. After a little while it becomes automatic to do that thing in that way, and very difficult to do it in any other way, because of the groove in the mind, and that is how a habit is formed. The important thing to remember is that bad habits are just as easily formed as good ones, and even harder to break. It is for us to see by our wise management of little children that the habit grooves are formed in the right direction. One might put it that it is our duty and our privilege to see that on the smooth, pure surface of the baby's mind the writing is beautiful and vigorous and clear, not muddy and irregular and purposeless.

Did you know that the animals carefully train their babies in habits of cleanliness, regularity, &c., from the very start? They cuff them, scold them, and even punish them when necessary rather than allow them to form bad and irregular habits. All this is done by instinct, and we with our greater knowledge and intelligent love should at least do as well as the animals.

The Spoilt Child.

Just think for a moment of the plain meaning of the word "spoiled." We all realise what is involved in the spoiling of a dress or a dinner, but do we stop to consider what "spoiling" a child really means. It is rather terrible when one comes to think of it, isn't it? For the spoilt child is a selfish child, who is being allowed to form habits of self-indulgence and inconsiderateness for others which are "spoiling" his character and weakening his mind and his soul for life. Surely we all wish to see the children we love grow up to be fine and unselfish, having a beautiful influence on all around them! Spoiling sows the seeds of failure, not success, in all the higher things in life.

At the same time, it is very definitely bad to be constantly checking, scolding, or even watching a child. Too much attention of any kind is harmful and leads to troublesome behaviour.

Freedom in the Nursery.

The very best atmosphere for babies and little children is one of freedom, with calmness and confidence in the minds of those in charge. The baby's greatest joy, and his most important means of learning, lie in freely exploring his little world—first of all his own fingers and toes, then his cradle and pen, later the floor and the furniture, and eventually the whole house and garden and all the things and people in them. He loves independence, and his joy lies in doing rather than in having things. He is quite capable of finding his own amusement and making his own games by exercising his imagination on the common things about him. We have to beware of destroying his independence and stifling his imagination and his self-reliance by doing things for him instead of letting him do for himself or by providing him with too many ready-made toys.

Simple Rules for Guidance.

Here are a few simple rules to guide one in training children. Of course, all cannot be treated alike, but there are a few broad lines of treatment which everyone should try to follow:—

1. Do not do for a child what he can do for himself. Teach him to dress himself, feed himself, to sleep and to play by himself, and to do little duties regularly "to help mother."
2. Leave him alone as much as possible. Watch him, but keep in the background. Fussiness and over-attention are as bad as neglect. Children need love, but they do not need constant fondling and fussy attentions.
3. Never use idle threats of punishment.
4. Insist on obedience on a few essential points, but do not threaten or make demands which you cannot or do not mean to carry out. In teaching obedience one must learn to distinguish between essentials and small things which do not really matter.
5. Use the word "don't" as little as possible.
6. Remember that the child's ceaseless activity is natural. Provide harmless useful outlets for his energy in place of destructive ones, and then leave him alone.
7. Keep your promises. Do not make empty ones which you cannot keep. If something prevents you keeping a promise explain why. In every way build up and preserve the child's trust in you.
8. Be consistent and reasonable. Children are very logical, and are upset by inconsistencies.
9. Do not let a child be frightened by imaginary fears—bogeys and policemen and so forth—or by horrid things. At the same time one must guard against making him soft and sensitive by shielding him too much.
10. Do not laugh at a child in a way to make him feel ridiculous. Encourage his efforts to make and do things.
11. Teach him to be considerate of other people's feelings, kind to animals, and appreciative of beautiful and good things everywhere.
12. Use your common sense.

Orchard Notes for April.

THE COASTAL DISTRICTS.

IN the Orchard Notes for March the attention of citrus growers was called to the necessity of their taking the greatest possible care in the gathering, handling, sweating, grading, and packing of the coming crop of fruit, as the returns for the labour expended in the upkeep of their orchards will depend entirely on the condition in which the fruit reaches the market. Many growers fail to realise the very important fact that the success of fruitgrowing does not depend merely on the proper working and management of the orchard, so essential for the production of a good crop of high-class fruit, but that the manner in which the fruit is handled and placed on the market is of even greater importance. In no branch of fruit culture is this more evident than in the case of citrus fruits, as no fruit pays better for the extra care and attention necessary to enable it to be marketed in the best possible condition. Every season there is more or less loss in the consignments sent to the Southern markets, the percentage depending mainly on the weather conditions, the loss in a wet year being much heavier than that in a dry year.

A very large percentage of the loss is due to what is known in the trade as specking—viz., a rotting of the fruit caused by a mould fungus—and this loss can be prevented, provided necessary precautions are taken. Although this matter was dealt with last month, it is of such vital importance to our citrus growers that it is necessary to again refer to it.

In the first place, growers must clearly understand that specking cannot occur on perfect fruit, the skin of which is free from injury of any kind. The fungus causing specking can only obtain an entry into the fruit through an injury to the skin; it will thus be seen that the remedy for specking is to take every possible care not to injure the skin of the fruit in any way.

Few growers realise how easily the skin of citrus fruits is injured, especially that of fruit grown under moist and humid conditions, when the skin is full of moisture and so tender that the least sign of rough handling causes serious injury, as the cells of the skin are so brittle that they are easily broken, and when so broken a ready means of entry for the mould fungus is provided, and specking follows in due course.

The remedy for specking is in the hands of the grower, who must learn so to gather, handle, and transport the fruit from the orchard to the packing-shed that it does not receive the slightest injury, and further, that when it has reached the packing-shed it must be carefully placed in shallow bins or on trays and be exposed to the air for at least seven days, so that the surplus moisture in the skin may be removed, and the skin thus become toughened and less easily injured. This drying of the skin is known as "sweating," and during the time the fruit is being sweated it should be kept under observation, and all fruit showing signs of specking or injury from fruit flies, sucking or boring insects, mechanical injury or bruising, should be removed.

In order to prevent injuring the skin when gathering, all fruit must be cut and not pulled. Gloves should be used to handle the fruit, and when cut it should be placed in padded baskets or other suitable receptacles. Any fruit that falls or is injured in any way should be rejected, as it is not fit to send to a distant market. At the same time, if the injury is only slight, it can be sent to a local market for quick sale.

For Southern markets only perfect fruit should be selected, and further, it must be graded for size, colour, and quality, and properly packed, only one grade of fruit being packed in a case. The cost of cases, freight, and marketing is now so high that only the best fruit will pay to send to the Southern States, and even the best fruit must be properly graded and packed in order to produce the best returns.

All orchards, vineyards, and plantations not thoroughly clean should receive immediate attention, as from now till the next rainy season the ground must be kept in a thorough state of tilth and free from weeds in order, in the first place, to retain moisture in the soil, and, in the second, to enable birds, ants, and predaceous insects to get at and destroy the pupæ of fruit flies and other pests harbouring in the soil.

Banana and pineapple plantations must be put into good order, and kept free from weed growth.

Land to be planted with trees should be got ready, as, if possible, it is always advisable to allow newly cleared land time to sweeten before planting.

Farm Notes for April.

FIELD.—Those areas already lying in fallow for subsequent sowing with wheat should be kept in good tilth, using field implements that have a stirring effect in preference to those which tend to reverse the surface soil. The surface should never be allowed to cake; consequently all showers must be followed by cultivation, as soon as conditions will permit of teams and implements working freely.

Early fodder crops, such as barley (skinless or Cape) and certain varieties of wheat may be sown during April. Growers of winter fodders will be well advised to study the article dealing with dairy fodder plots which appeared in February, 1922, Journal.

Potatoes should now be showing good growth and must be kept free from all weed growths by means of the scuffler. If sufficiently advanced, and any doubt exists as to the prevalence of blight, advantage should be taken of fine weather to give a second spraying of "burgundy mixture," a calm and somewhat cloudy day being chosen if possible for the spraying.

Where land has been previously well prepared, lucerne sowing should be carried out this month, and intending growers of this fodder will be well advised to ascertain the germinating qualities of seed submitted to them for purchase. The difference between a good and bad "strike" is often traceable to the poor class of seed sown.

Maize and cotton crops should now be in the harvesting stage, and, once matured, are better in the barn than the open paddock, where weevils and other insects are usually prevalent at this season of the year.

Root crops sown last month should now be making fair growth, and during the early period of such should be kept free from weeds, and where necessary thinned out. Sowings of mangels, swedes, field carrots, sugar-beet, and rape may still be made where conditions of moisture will permit.

As the sowing season is close at hand for certain varieties of wheat—i.e., those which require a fairly long period to develop in—every effort should be made to bring the seed-bed into the best possible tilth and to free it from foreign growths of all kinds. The grading of all seed-wheat is strongly recommended, and growers who favour certain varieties should adopt a system of seed selection from prolific strains with a view to the raising of larger quantities of pure typical grain for ultimately sowing in their larger fields.

Pickling of wheat to prevent smut (bunt) is necessary. Germination tests should be carried out prior to commencing seeding operations.

Sorghums which have matured and are not immediately required as green fodder should, wherever possible, be conserved as ensilage to provide for a reserve, to tide over the period when grasses and herbage are dry. Succulent fodder of this description is the best possible form of insurance against drought, and for maintaining dairy and other stock in thrifty condition.

EXAMINING THE BEEHIVE.

To prepare to examine a colony of bees it is necessary to have an efficient smoker and a hive tool, or a lever the shape of a screw-driver. It is advisable, too, to have a veil in readiness to afford protection for the face. There are apiarists who do not use a veil; but the beginner is advised to have it carefully adjusted, for even the most practical apiarists like to wear a veil or have it on the hat so that protection can be had when required. However, if the manipulation is carried out in the right way there should be very little trouble as regards stinging. A colony should not be examined unless the day is fine enough to allow the bees to work freely, and it seldom happens that a colony should be examined during the winter months.

Before attempting to remove the cover, it is advisable to give the guards at the entrance a couple of puffs of smoke, then raise the cover about 2 inches and give two or three puffs of smoke right over the frames. The cover can then be removed. Note should be taken whether the bees are tending to become excited at any time during manipulation, in which case a little more smoke may be given, but there is no need to overdo the smoking, for unnecessary punishment of this kind demoralises the bees.

To remove a frame, level the adjoining ones so as to give sufficient clearance to prevent crushing the bees; if there is any burr comb it is best to cut it as near as possible to the adjoining frame. When examining combs always hold the frame so that the comb will be upright, otherwise the new honey will drip about the hive, while the comb, having no support from the frame, is likely to be damaged.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	March, 1932.		April, 1932.		MOONRISE. Mar., 1932.	Apr., 1932.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
						a.m.
1	5.48	6.22	6.5	5.47	...	1.25
					a.m.	
2	5.49	6.21	6.6	5.46	12.31	2.25
3	5.49	6.20	6.6	5.45	1.31	3.19
4	5.50	6.19	6 7	5.44	2.31	4.13
5	5.50	6.18	6.7	5.42	3.30	5.5
6	5.51	6.17	6.8	5.41	4 30	5. 57
7	5.51	6.16	6 8	5.40	5.28	6.48
8	5.52	6.14	6 9	5 39	6.20	7.42
9	5.52	6.13	6 9	5.38	7.8	8.40
10	5.53	6.12	6.10	5.37	7.59	9.34
11	5.54	6.11	6 10	5.35	8.55	10.29
12	5.54	6.10	6.11	5.34	9.50	11.24
						p.m.
13	5.55	6 9	6.12	5.33	10.46	12.17
14	5.56	6.8	6.13	5.32	11.41	1.8
					p.m.	
15	5.56	6.7	6.13	5.31	12.36	1.54
16	5.57	6.5	6.14	5.30	1.32	2.31
17	5.57	6.4	6.14	5.29	2.26	3.8
18	5,58	6 3	6.15	5.28	3.16	3.43
19	5.58	6.2	6.15	5.27	3.59	4.17
20	5.59	6.1	6.15	5.26	4.39	4.53
21	5.59	5.59	6.16	5.25	5.13	5.32
22	6.0	5.58	6.16	5.24	5.48	6.13
23	6.0	5.57	6.17	5.23	6.24	7.11
24	6.1	5.56	6.17	5.23	7.3	8.11
25	6.1	5.55	6.18	5.22	7.42	9.13
26	6.2	5.53	6.18	5.21	8.30	10.16
27	6.2	5.52	6.19	5.20	9.23	11.16
28	6.3	5.51	6.19	5.19	10.24	...
						a.m.
29	6.3	5.50	6.20	5.19	11.25	12.17
30	6.4	5.49	6.21	5.18	...	1.15
					a.m.	
31	6.5	5.48	...	...	12.25	...

For places west of Warwick and nearly in the same latitude, 28 degrees 23 minutes S. add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

Phases of the Moon, Occultations, &c.

1 Mar.	●	New Moon	5 54 p.m.
15 ,,	☾	First Quarter	10 41 p.m.
22 ,,	○	Full Moon	10 37 p.m.
29 ,,	☽	Last Quarter	1 43 p.m.

Apogee, 11th March, 7.54 a.m.

Perigee, 23rd March, 7.12 p.m.

The first of the four eclipses, two of the Sun and two of the Moon, which will occur this year, will be a partial eclipse of the Sun on 7th March, commencing about 5.45 p.m. and continuing for only about half-an-hour at Brisbane, where less than a-quarter of the Sun's face will be obscured by the Moon as the Sun is setting. At Melbourne, more than three-quarters of the Sun will be obscured. Between two lines less than 170 miles apart, running from below Tasmania far into the Southern Polar regions, the beautiful sight of a golden ring of the Sun's disc surrounding the Moon will be observable.

A fortnight later, on 22nd March, an all but total eclipse of the Moon in the Earth's shadow, will take place, observable between 9 p.m. and a little after midnight.

A good opportunity to test the eyes will occur on the afternoon of the 11th, between 4 and 5 o'clock, when Venus and the young Moon will be sufficiently high above the western horizon for keen eyes to detect the planet about 2 degrees south of the Moon in broad daylight.

On the 21st the Sun will be passing from the south to the north of the celestial equator, and the Australian autumnal Equinox will occur.

On the 23rd Mercury will be about 18 degrees above the western horizon at sunset, and, although only at medium brilliance, should be fairly well seen amongst the small stars of Pisces as the twilight decreases.

The occultation of Antares about midnight on the 27th will be an interesting object for telescopist observers. Though the Moon will have a high southern declination, the time at which the occultation will occur in any part of Queensland will allow for the telescope being directed at a fairly good angle from the perpendicular.

Mercury sets at 6.35 p.m., or 13 minutes after the Sun, on the 1st, and at 6.48 p.m., or 41 minutes after it on the 15th.

Venus sets at 8.16 p.m. on the 1st, and at 8.7 p.m. an the 15th.

Mars sets at 6.6 p.m., or 16 minutes before the Sun on the 1st, and at 5.45 p.m., or 22 minutes before it, on the 15th.

Jupiter rises at 5.5 p.m. on the 1st, and at 4.6 p.m. on the 15th.

Saturn rises at 2.46 a.m. on the 1st, and at 1.54 a.m. on the 15th.

The Southern Cross comes into view early in the evening in March. By 8 o'clock it reaches position IX., having the same horizontal position as those figures on a clock-face and being as far as possible eastward of the south-celestrial pole from which the star at the head of the Cross will be 33½ degrees. It will be upright at 2 o'clock in the morning. These positions will be reached two hours earlier at the end of March.